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SELECTIONS

FROM THE

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OF

THE GOVERNMENT OF INDIA.

FOREIGN DEPARTMENT.

No. XLIX.

LIBRARY OF THE BOMBAY BRANCH OF THE ROYAL ASIATIC SOCIETY

JOURNAL

OF THE

SALWEEN SURVEYING EXPEDITION.

DURING THE SEASON 1864-65.

(With Route Map.)

Published by Authority.

CALCUTTA:
MILITARY ORPHAN PRESS.
6, BANKSHALL STREET.
1865.

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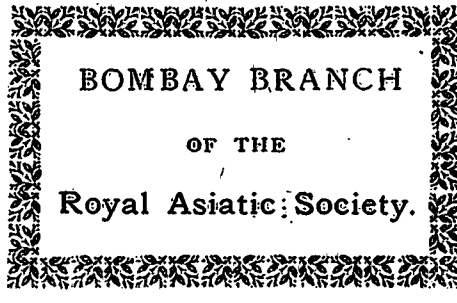

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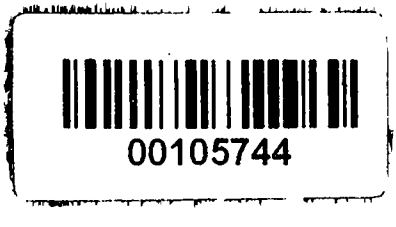

From LIEUT. COLONEL A. P. PHAYRE, C. B., *Chief Commissioner of British Burma and Agent to the Govr. Genl., To the Secy. to the Govt. of India, Foreign Dept.,—No.* 176, *dated Rangoon,* 10*th August* 1865.

With my letter No. 168, dated the 5th of August 1864, I had the honor to submit a proposition for an expedition to be formed to explore the upper course of the River Salween. Sanction to this plan was conveyed to me by your letter No. 404, dated the 22nd of August last. In pursuance of that sanction, Captain C. E. Watson, of the Royal Artillery (Madras), Assistant Commissioner, British Burma, and Mr. Francis Fedden, Assistant in the Geological Survey of India, were appointed to carry out the objects in view. I have now the honor to submit the results of their expedition as follows :—

1st.—Journal of Captain C. E. Watson.

2nd.—Report on the navigability of the Salween River by Mr. F. Fedden, with Meteorological Tables and observations for latitude, &c.

3rd.—Map by Mr. F. Fedden, showing the route taken by the travellers.

2. It is well known that the Salween River, about 80 miles above Maulmain, is barred by rocks and rapids which prevent navigation. From that point the British territory extends about 80 or 90 miles further north on the western bank; and within that territory the River Salween is still unsuited for navigation. The object of the expedition was to ascertain whether, beyond British territory for 3 or 400 miles, the river was navigable or not; for on this point there was no trustworthy information. If the Salween River had been found to be navigable for steamers for 3 or 400 miles above British territory, it then would have remained to be considered, *first*, whether the course of the river within British territory might be improved, or the passage upwards of steamers into the river beyond the great rocky barrier be otherwise rendered practicable; or, *second*, whether the open portion of the river in its upper course might be navigated by steamers, and the southernmost point to which they could reach be connected by a road with the clear channel below the great barrier, from whence the navigation to Maulmain is easy.

3. There is no question but that the opening of the Salween River to steamers would be an event of great importance to commerce, for the river passes through countries inhabited by Shans, an energetic and industrious people; and it flows also through the western portion of the Chinese province of Yunân. But the survey has clearly shown that the upper portion of the Salween River is so frequently interrupted by rocks and rapids that it is not navigable.

4. The Reports by Captain Watson and Mr. Fedden will be found to contain much interesting information on the country and people through which they passed. I trust that the manner in which they have carried out the important duty with which they were entrusted will be found to merit the approbation of His Excellency the Viceroy and Governor General in Council.

5. The Burmese Government cordially assisted the travellers, and this under circumstances—arising from disturbed state of a portion of the Shan States—which might, without reproach, have rendered them unwilling to allow British travellers to pass through the territory.

6. I beg to recommend that the whole of the Journals and Report now submitted may be published, together with the Map.

JOURNAL OF CAPTAIN C. E. WATSON, IN CHARGE OF THE SALWEEN EXPEDITION, DURING THE SEASON OF 1864-65.

We left Shwé Gyeen on the 21st November, and arrived at Toungoo on the 29th, distance 86 miles.

This road is so well known, that no particular description seems needed. It may, however, be remarked, that by constructing rude bridges of material obtainable on the spot, and by occasionally turning the road round swamps, the land route between Shwé Gyeen and Toungoo might be made practicable for carts during seven months of the year. On the road met several parties of Shans with ponies and bullocks, the latter laden chiefly with stick-lac and kyantaga (coarse sugar) on their way to Rangoon and Maulmain. Halted at Toungoo from the 30th November to the 5th December, waiting for the mail and a second pass from the Mandalay Court.

December 5th, Monday.—Left Toungoo and marched to Lay-doung-gan, distance 8 miles. There is a good wooden zayat at the halting place. The water from the tank is indifferent. Road for first 3 miles very swampy. For the next 3 miles passed through paddy-fields, along the bank of a stream, by means of which the surrounding cultivation is irrigated. After passing through a small patch of jungle, reached another extensive paddy plain on the extremity of which was the halting place.

December 6th, Tuesday.—To Toung-nyo, distance 10 miles. Road good the whole way. Passed Nat-yay-dwen at 6 miles. Here there are good zayats and water. Ditto at Shwé kyay-yeet, 2 miles further on. Halted at the head quarters of a Thoogyee. Here the zayats and water are very bad.

December 7th, Wednesday.—Marched to Thagarah, distance 12 miles. There is no good halting place on the road, except at the crossing of the Tswa Choung, about half-way. Road very sandy, but good, though the walking was heavy. Met several carts from Yemathin and Ningyan, very lightly laden with tobacco, onions, &c. Many were drawn by six bullocks. I was informed that as no bullocks were allowed to be taken from Burmah Proper to Toungoo for sale, the people adopted the device of taking down six bullocks to each cart, and returning with only two.

December 8th, Thursday.—To Myo-hla, our frontier village on the Sittang (or, as it is there called, Poung-loung stream), distance 8 miles. Road very good the whole distance; at this village are stationed 30 Policemen under a Head Constable. They live in a small bamboo stockade, about 50 yards from the river bank. The houses, inside, are all thatched, and as the stockade itself is constructed of highly inflammable materials, a

torch applied to any one of the buildings would soon reduce the whole place to ashes.

Sent on a letter to the Myowon of Ningyan, informing him of our arrival at the frontier.

December 9th, Friday.—To Mee-pyra-kon, distance 9 miles. Passed an outpost of our Police at 3 miles. There is a small stockade similar to the Myo-hla one at this post. Strength of guard, 10 men. Between this outpost and the boundary pillars, distance about 1 mile, saw large numbers of broken carts. It is said that the object of the majority who go down to British territory with carts is merely to sell their bullocks, and the carts, being generally of a very rotten description, are discarded as soon as they cross the frontier.

The first Burmese outpost is about 1 mile beyond the boundary pillar. A barrier is here placed across the road, and every body passing has to report himself to the Officer in charge. Saw the baskets of several Shan traders being examined. From enquiries made from the merchants, I am led to believe that, as a rule, each bullock and pony passing through is taxed four annas, and each person carrying a load two annas. The Shans themselves say that the average sum they have to pay during the journey to Rangoon or Maulmain and back is Rs. 3½ a bullock.

December 10th, Saturday.—To Thon-doung-Choung, distance 9 miles. Here received an answer to the letter sent to the Myowon. He expresses great pleasure to hear of our arrival, and sent his Kin-tat-hmoo (the head man of the outpost) to meet us. Being told that Ning-yan was only 6 miles distant, we determined to march in the same evening. Started at 3-30 P. M., and reached Ning-yan at 7-30 P. M. Found the distance to be 9 instead of 6 miles. On arrival the Myowon asked us to come and take some refreshments at his house, but excusing ourselves in consequence of the lateness of the hour, we crossed the stream, and encamped near a cluster of zayats, about half a mile from the Ning-yan house. The road from the frontier to this town passes through extensive forests of Ein and Teak. The soil is very sandy, and though the road is perfectly dry now, it was evidently in some places 2 or 3 feet under water during the rains. As we approached the town, saw large quantities of very fine teak timber, all ready to be floated down next monsoon.

December 11th, Sunday.—Visited the Myowon. He met me on the top of the steps of his house, shook me by the hand, and conducted me to a room where there was a large table spread with a variety of cakes and fruits. We both sat on chairs and conversed together for nearly an hour. At parting he expressed a wish that I would come and see him again before leaving Ning-yan.

December 12th, Monday.—Bazaar day. These occur as in the Shan States once in five days. Walked through the new town, which is on the south side of the stream. We are at present living near the site of the

old town, on the north side. The change was made in consequence of the left bank of the river being much lower than the right; the ground on the north side was completely flooded during the rains. Some very good houses have been built in the new town, but little has yet been done in the way of roads. The Myowon is building a fine new residence and Court-house near the site of his present temporary abode. The town consists of 800 houses. The streets are laid out after the manner of all large Burmese towns.

December 13th and 14th, Tuesday and Wednesday.—Halted. Our second pass from Mandalay not having arrived, there was no use in our hurrying on. We have received every day, since our arrival, presents of provisions from the Myowon. Attended a Pooay at his house on the evening of the 13th, stayed there till midnight, though the performance was of a rather mediocre description.

December 15th, Thursday.—Marched to Chee-doung-gan, distance 10 miles. The road throughout was good for carts. Cultivation very scarce. Passed only one small village en-route called Hlai-pyin-kyai. The zayat at the halting place is very commodious and well built. Water is scarce, and obtained by digging small holes in the bed of a dry nullah.

December 16th, Friday.—To Shwé Myo Zayat, distance 12 miles, and about half a mile from the Tsin-thay-Choung, which is the nearest water procurable. From here there are two roads to Yemaithin. We take the western one, though longer, as carts cannot at present go by the eastern one. As we proceed, the soil becomes richer, and the population denser, to judge by the great increase of cultivation.

December 17th, Saturday.—To Kywon-pin-kon, distance 12 miles, and half mile beyond the large village of Oung-kyee-kon. The village of Ming-yua on the eastern road lies about 2 miles to the south-east. Here there are two large zayats, and a large stream of water. The villages along to-day's march were very numerous, and the cultivation extensive. This is now the middle of the harvest time. The crops appear in first-rate condition. There is a fine new Phoongyee house, pagodas, and zayats at our halting place. The inhabitants obtain their water from a small tank. This is scarcely drinkable. We sent to the Nawin Choung, a distance of a mile, to obtain ours.

December 18th, Sunday.—Halt.

December 19th, Monday.—To Mai-oung-gan, distance 10 miles. This is an excellent halting place, with a fine new zayat, and a large tank of water. On the way passed several large villages, amongst the rest about 2 miles distant from each other. The whole country appeared under cultivation.

December 20th, Tuesday.—Marched nearly the whole distance, 8 miles, through paddy-fields. When about 1 mile from the town of Yemaithin were met by the Tseetkai (son of the Ning-yan Myowon). Accompanied him to his house, stayed there a short time, and then took up our quarters in a large zayat, near a tank on the north side of the town, close to the bazaar.

December 21st, Wednesday.—Received a visit from the Tseetkai and other officials. Was informed that the Officer sent from Mandalay to accompany us had not yet arrived, but that he was expected daily. Shortly after the Tseetkai took his departure, that Officer, whose Burmese title is Nakan, made his appearance. He said that he had just arrived, though, from what I previously heard, I believe that he was here two days ago. He is an old Shan, apparently upwards of 60 years of age. A few years ago he acted for a short time as Nakan at Monai, the capital of the Shan States. In the evening the Tseetkai sent over a broker to arrange about the bullocks we require for carriage. Finding that it is preferable to hire than to purchase, it is agreed that to-morrow the owners shall attend at the Tseetkai's house to sign the agreement we may then make.

December 22nd, Thursday.—Drew out the agreement for the hire of 20 bullocks at the rate of Rs. 20 each for the trip to Theinnee, and Rs. 50 for the drivers. The Tseetkai kindly consented to stand security for the correct fulfilment of the contract.

December 23rd, Friday.—Accompanied the Tseetkai to the Shwé-hmin-tin Pagoda, which is situated on a high hill about 5 miles to the east of the town. A fine view is here obtained of the surrounding country. As far as the eye can reach, north and south, appears one enormous plain extensively cultivated. To the westward, at a distance of 30 or 40 miles, is seen a low range of hills, beyond which flows the Irrawaddy. To the east lies a range of hills that preserve a tolerable uniform direction of N. and S., from Lat. 18° to Lat. 22° N. The highest point of the range visible from here is not more, I think, than 2,000 feet above sea level.

December 24th, Saturday.—Took a walk round the town, which is enclosed by a massive parapet of earth, or rather the remains of what was years ago a parapet. The old ditch is clearly traced round the town, and in some places is full of water. The houses in the town are of a very inferior description, and not to be compared with those at Ning-yan, but the Phoongyee houses and zayats outside are very numerous and well built. There are also some handsome bridges across the ditch of the old Fort. There are many large masonry tanks containing excellent water in the vicinity of the chief Phoongyee houses. The town itself is about the same size as Ning-yan (1 mile square), but in the immediate neighbourhood are several large villages. To the south of the town lies a large tank called Kyee-nee-gan. It is about 2½ miles in length by 1½ miles in breadth. At all seasons of the year it is covered with water-fowl. I have never seen snipe so numerous as they were along the sides of this lake. During my stay I had some capital shooting here. I was accompanied twice by the Tseetkai, but as he did not attempt to "shoot flying," of course he did not add much to the bag. Since entering Burmese territory, I have seen and heard many things that induce me to believe that the people of all the districts we have passed through are, as a

rule, in any thing but prosperous circumstances. Considering the facility with which articles of food are raised, and the exemption that the people enjoy here from the destruction of their crops by floods, the state of affairs can only be ascribed to misgovernment. There is no doubt that the agricultural classes in the parts of British Burma where the soil is least productive live in a much greater state of ease and comfort than do the agricultural classes in the best districts of Burma Proper. These remarks equally apply to that part of the country I passed through last year on my way to and from Mandalay. The imperial taxes that the people pay are, 1st, a poll tax of 3 tickals of silver (equal to about 4½ Rupees in our coin); 2nd, a land tax, assessed at $\frac{1}{10}$th of the value of the crops. These taxes do not appear to be excessive, but when it is considered that a number of officials, great and small, live entirely on what they can screw out of the people, it is not to be wondered that complaints are made of over-taxation. Most Burmese officials, on their Chiefs being removed, are liable to lose their appointments. Their tenure of office being so uncertain, they take good care to "make hay whilst the sun shines."

December 25th, Sunday.—Received a letter from Dr. Williams, the Chief Commissioner's Agent at Mandalay. He states that there are serious disturbances in the Theinnee district, and that troops have been sent there from Mandalay.

December 26th, Monday.—The Tseetkai left this day for the town of Pindalai to meet the Kai Won (the chief official of the districts south of Mandalay).

December 28th, Wednesday.—The second pass from Mandalay arrived to-day, so we are determined to start off on the 30th.

December 29th, Thursday.—Our bullocks arrived to-day, and we were busy all day in arranging their loads. I may here mention that a box larger than a 1-dozen case cannot be slung on a bullock. On level ground bullocks will carry a weight of 80 lbs., but over hilly ground a weight of 50 or 60 lbs. is considered sufficient.

December 30th, Friday.—Marched to Thayet-myoung, distance 10 miles. For the first three miles passed along paddy-fields to the large village of Tsein-gone, inhabited mostly by Shans. This is a great emporium for bullocks, and ours were from this village. The remainder of the road passed over sandy and rocky ground, the cultivation consisting of two or three small Toungyas.* Having winded for 3 miles into the hills, we encamped on a small stream where there is a comfortable zayat. No view is obtained from here, the hills closing in on all sides.

* (Hill clearings.)

December 31st, Saturday.—At starting ascended a very steep range of hills, the highest point where there is an encamping ground being 2,000 feet above sea level. Here met 100 bullocks from the Nyoung Yooay and Laigyah districts, on their way south, laden with stick-lac,

ground-nuts, kyan-taga, sweetmeats, &c. Also passed 50 bullocks laden with salt and ngapee, returning from Magway on the Irrawaddy. (Magway lies about 50 miles to the east of Yemaithin, and there is a good cart-road between the two towns.) From the summit of the range the ground gently undulated. After descending about 500 feet in a distance of 5 miles, halted at the village of Nankwai, distance 8 miles.

January 1st 1865, Sunday.—Halt. Jungle fowl more plentiful here than I have ever before seen them. We have shot nearly 10 brace since arrival. Thermometer at noon only 69°. At 6 A. M. at 45°.

January 2nd, Monday.—Road very hilly. In many places blocked up by the overhanging branches of trees under which the bullocks passed with ease, but which we were obliged to clear away for the elephants. Met numbers of Shans, their women, and children on their way to the Rangoon Pagoda. I think that few of these families intend to return. Passed 80 bullocks on their way to Toungoo. Encamped on the top of a high hill at a tsakan called Nyoung-cheedouk, distance 8 miles. Water very scarce, and nearly one mile distant. Our elephants did not come up till 3 P. M.

January 3rd, Tuesday.—At starting slightly descended, and after marching for about 1 mile, ascended the Yomah Range, then after several abrupt ascents and descents, reached a small stream which we followed for about half a mile to its junction with the Poung-loung or Sittang River. The Poung-loung here is a small mountain stream. It takes its rise from the Tsin-doung Range, about 20 miles distant. The road during the last two marches resembles the one we took last year after leaving the valley of the Sittang at Baugatah. During the last two days we have seen no signs of habitations, though a few old Toungyas were noticed in the distance. Encamped on the banks of the Poung-loung, distance of march 6 miles.

January 4th, Wednesday.—Marched to the foot of the Tsin-doung, distance 5 miles, and encamped in a beautiful valley enclosed on all sides by high mountains. The Tsin-doung Range forms the boundary between Burma Proper and the Shan States.

January 5th, Thursday.—At starting commenced the ascent of the Tsin-doung; reached the summit after 2½ hours' marching, distance not more than 5 miles. As the elephants did not arrive till past 10 A. M., we determined to halt here for the day, there being no other tsakan within a reasonable distance. The plateau where we encamped was 100 feet above sea level. A very cold north-east wind blew here all day. The thermometer at noon stood as low as 60° in the tent, when exposed to the wind it fell to 51°.

The highest peak of the range was found by the boiling point thermometer to be 4,675 feet. In the afternoon visited a village of Toungyos, some 2 miles from camp. Outside the village saw a small picquet of Burmese Troops. The Sergeant in command accompanied me to the

village. The houses were very snugly built. The roofs extended to near the ground, and round each house was a thick fence of bamboo mat as a protection against the cold winds. Inside they were divided into small rooms about 6 feet by 3 feet. In the centre was left a large room for cooking, &c. In appearance the Toungyos resemble the Toungthoos. Their dress is, however, more like that of the Karen-nees; the women wearing large brass rings extending from the knee to the ankle. They are very wild, though inoffensive, race of people. They keep as much as possible to themselves, and conceal their villages in the most inaccessible positions.

January 6th, Friday.—To Toung-lah, a large Shan village, distance 7 miles. Descended for about 1,000 feet, and then reached the highlands of the Shan States. On the road caught sight of Inlay Yua, the residence of the Governor of the Shan States, where we were detained last year for 27 days. It was not more than 15 miles distant in a direct line to the south-east. Heard to-day that the Governor had reached the village of Yay-nan at the entrance of the Nattick Pass. He is on his way down from Mandalay. Had he been at his head quarters, I would have deviated from our direct road in order to visit him, though, after the ill treatment we experienced at his hands last year, I have no wish to make his acquaintance.

January 7th, Saturday.—Marched along gently undulating ground for 10 miles to the village of Oung Ban. Cultivation very extensive. The paddy has been all cut in this part of the country some time ago, so it now presents rather a barren appearance. No trees are to be seen except in the enclosures of the different villages. We are obliged to purchase our firewood at the rate of 4 annas for a cooly load. The Nakan who has accompanied us from Yemaithin told me this afternoon that he had heard that the troops sent from Mandalay to Theinnee had been completely routed by the Shan rebels under Tsanhai. He seemed very anxious that we should pass through Inlay-Yua, thence viâ Nyoung Yooay and Laigyah, to Theinnee. He evidently wishes us to delay in order that he may communicate with the Governor.

January 8th, Sunday.—At 6 A. M. the whole hill on which we are encamped was white with frost. My basin of water that I put outside the camp last night was covered with ice about $\frac{1}{8}$th inch thick. In the afternoon I walked over the large village of Tsamakan, where we halted last year on our 2nd march from Inlay-Yua. Called at the house of the headman of the village. I was recognised at once by his family, who seemed very glad to see me.

January 9th, Monday.—To Tingyay-gyat, a large village of Toungyos and Toungthoos, distance 7 miles. Road most excellent the whole distance, and the villages very numerous.

January 10th, Tuesday.—Road much the same as yesterday. Caught the view of an extensive valley to the eastward, apparently all under cultivation.

Between this valley and the Nyoung Yooay one is a low range of hills. Met 150 bullocks from Monai and 100 from Laigyah on their way to Toungoo, laden with stick-lac, kyantaga, sweet-meats, ground-nuts, Shan boxes, coats, trowsers, &c. Also saw strings of laden bullocks on the plain below on their way to Inlay-Yua. After marching N. 15° E. for 8 miles, reached the large town of Kyouk-tat, and encamped in a large cluster of zayats, close to the bazaar and near a fine tank of water.

January 11th, Wednesday.—As our elephants required rest, we halted to-day. Since descending the Tsin-doung we have seen no jungle whatever. In consequence of the great scarcity of wood, the Shans are unable to build good houses; very few are raised from the ground, and they mostly have mud walls. Round all the villages are large clumps of bamboos and fruit trees, owned by the old inhabitants of the place. We are obliged to buy the branches of banyan trees, pumpkins, sugar-cane, &c., as food for our elephants. A quantity of lead ore, rich in silver, is found in this neighbourhood. I visited the buildings where the ore is smelted. From information obtained on the spot, ascertained that from 2 to 3 tickals of silver were paid for one basket (about a bushel) of the ore, and that the value of the yield of silver from that quantity was from 3 to 4 tickals. The ore is first smelted in large furnaces, and the lead and silver mixed; that runs out through a funnel at the bottom of the furnace is placed in another furnace in which there is live charcoal, several inches thick. I did not see the metal placed in this furnace, but I was told that about 30 viss had been put in about one hour previously. On looking into this second furnace, a small white speck was visible on the surface of the red-hot charcoal. This gradually enlarged; and I saw a flat piece of silver weighing 10 tickals taken out of the furnace with a long iron spoon. This after a little difficulty I purchased for Rs. 15. The information I obtained regarding the working of the mines and the amount of revenue that the Government obtained therefrom was so contradictory, that I am unable to give an opinion on these points.

Having mentioned to our Nakan that I was surprised that the headman of the town had not visited us, nor sent any of his subordinates, in the evening one of his writers, accompanied by the Nakan, paid us a visit. It was said that the headman was absent the day of our arrival, and that being sick he was unable to see us. But these statements I had good reason to disbelieve. The Nakan said he thought it as well if we would halt here four or five days, in order that we might obtain information of what was going on in the Theinnee District. He also stated that he had that day received a message from the Governor of the Shan States, expressing a wish that we would proceed by the Nyoung-yooay Road. In reply told the Nakan that we had no intention of halting for four or five days, and that we intended to take the shortest and best route to Theinnee, as he himself had suggested a few days previously. Moreover, that we could pay no attention to any indirect messages from the Governor.

January 12*th, Thursday.*—Along a very level road to the village of Taithone. Encamped in some paddy-fields near a fine well of water to which the peoole from more than 1 mile around come to draw their water. General direction of march N. 20° W., till we approached to within about 1 mile to the east of the town of Pwai-hla. Then turned nearly due north, and saw the town of Quindayah, about 2 miles to the west. Country we passed through was very thickly populated. To the evening had a heavy shower of rain. Thermometer at noon 70°.

January 13*th, Friday.*—It rained at 6 A. M. very heavily. At 7 A. M., when it cleared up, we started. The country as we proceeded became more thickly wooded, and the soil more rocky. Only saw signs of two villages during the whole march, a distance of 14 miles. Halted in an old Phoongyee house at a deserted village called Lekpán-kon. The rain came on heavily shortly before our arrival, so we were fortunate in obtaining good shelter for all. Thermometer at noon stood at only 68°.

January 14*th, Saturday.*—As the rain was still hanging about, we made a double march of 18 miles to the town of Maing Pyeen. Road very good to the whole distance. Met about 200 bullocks from Monai and Laigyah. The headman stated that they hoped to reach Toungoo, but they had heard that they would be stopped at Ning-yan in consequence of a misunderstanding having arisen between the British and Burmese Governments.

During the last 4 miles gradually descended to the Nyoung-yooay Valley. Saw only two small villages en-route. Soon after arrival the Burman Myooke of the town sent a writer to enquire whether we wanted anything, and also to conduct us to some good zayats in the enclosure of a large Phoongyee house.

January 15*th, Sunday.*—Early this morning the Myooke sent us presents of meat, fruit, and vegetables, and shortly afterwards paid us a visit, accompanied by his three wives. He stayed about one hour, and seemed much pleased with everything that we showed him. As our elephants require a rest, and there is good feeding for them here, we intend to halt till Thursday.

January 16*th, Monday.*—Engaged nearly all day in looking on at a rather inferior description of Pooay held in front of our zayats. Crowds of people attended, more, I think, to look at us than the Pooay. This town was last year completely destroyed by the Nyoung-yooay rebels.

The houses have been mostly re-built, and to all outward appearances the town is in a flourishing condition. Fruit and vegetable gardens are very numerous. I noticed grean peas, broad beans, gram, and a sort of turnip growing in large quantities. Shan coats, trowsers, and coarse paper are manufactured here. Small game abounds here, consisting of hares, partridges, duck, teal, and pigeons.

From this town we have the choice of two roads, one viâ Theebau, and the other viâ Laigyah. We take the latter, though longer, as we shall thereby avoid entering the Theinnee District, through the parts that are said to have been lately disturbed.

January 17th, Tuesday.—Returned the Myooke's visit.

January 19th, Thursday.—Marched to Pintsau, distance 7 miles, at the foot of a small range of hills.

General direction N. E. At starting crossed to the east side of the plain, then passed over a few small hills covered with Einkyin trees, perfectly bare of foliage, and encamped on a small mountain stream close to the village of Pintsau.

January 20th, Friday.—To Nahtit, a large village on the borders of the Laigyah District. Within a few miles of this, the Monai, Laigyah, and Maing Pyeen Districts join, and there are picquets from each district within a few miles of each other.

Road not so good as usual. Crossed one large hill called Nahdit, distance of march 7 miles.

January 21st, Saturday.—After proceeding for about 1 mile, saw a large stream running south. This is said to be the Poon Choung that joins the Salween a short distance above the Kainaypyoo in Karennee. Followed along the right bank of this stream for about 2 miles, and then ascended a very steep hill; after descending for about 2 miles, reached a tsakan called Maichinnoo.

We are here surrounded by high hills on all sides. The water is very scarce and obtained from a small spring about quarter mile distant.

January 22nd.—Halt.

January 23rd, Monday.—For the first 2 miles gradually ascended. From the highest point of the range, our intended halting place, in the valley below, did not appear to be more than 5 miles distant. The road, however, was very well laid out, avoiding all great declivities. The sides of the hills along which the road winded were for the most part scarped, so before reaching the valley we found that we had marched nearer 8 than 5 miles.

Encamped on the Poon Choung near the village of Kantour.

January 24th, Tuesday.—Marched up the Kantour Plain, for a distance of 5 miles, in an easterly direction. Then crossed a low range of hills and descended to the Laigyah Valley. The fog was so thick till past 9 A. M. that we could see nothing of the surrounding country. From the number of villages passed, it appeared to be densely populated. The town of Laigyah is situated towards the middle of an enormous plain that runs nearly north and south. Formerly it was one of the most important towns in the Shan States, but now it might easily be passed without notice were it not for the large parapet and ditch that surround it.

No houses are seen from the outside, the town being completely shut in, like most of the Shan villages, with thick clusters of bamboos. Distance of march 12 miles.

January 25th, Wednesday.—As our cattle require rest, we will halt for four days. We have found excellent quarters in some zayats, near the bazaar, to the south of the town. There is excellent shooting in the neighbourhood, so a few days' rest will be agreeable to all.

January 26th, Thursday.—Visited the Tsaubwa, a young and very intelligent—looking man. He lives in a large, though very ricketty, bamboo house in the centre of the town. The enclosure is protected by a brick wall. Inside are several large sheds for the troops. The Tsaubwa has only held his appointment since January 1864. During his father's time, the town was very large, but subsequently, on his elder brother succeeding to the Tsaubwaship, frequent disputes arose between the Laigyah Shans and those of other districts; and, as the present Tsaubwa said, "this town since my father's death has been attacked and destroyed every three or four years."

I asked the Tsaubwa several questions about roads, &c., to very few of which he would give only direct answer. At last he referred us to his ministers (as he called them). On asking one of them to send for merchants who were in the habit of travelling between Laigzah and Theinnee, in order that we might obtain information regarding the different roads, he made the astonishing statement that, during the nine years he had resided at Laigyah, not a single party of traders had ever come down from Theinnee. (We met a large party near Yemaithin, who had come down from Theinnee viâ Laigyah.) A report that we heard on the road between this and Maing Pyeen of an outbreak in the Monai District, has been confirmed. The large town of Moukmai, one march south of Monai, has been attacked by a numerous body of Shans and Karences, headed by one Kyan Pinyah, and the rebels are now threatening Monai.

Yesterday the Tsaubwa received an order from the Governor to proceed himself with 1,000 men to the disturbed district. The Governor has started from Inlay with 3,000 troops.

January 27th, Friday.—Received a message from the Tsaubwa, saying that as the Nakan would not give him leave, he was very sorry that he could not return our visit. He also said that he did not dare to show us any civility in the way of sending presents of food, &c., lest the Nakan should place a wrong construction on his acts. Last year we found that the Shan officials showed us every civility, and the Burmese none at all. This year matters are reversed.

January 28th, Saturday.—Since our stay I have been all over the surrounding country.

To the south are the remains of most extensive fortifications, enclosing an area of about four square miles. This is the remains of the old city

that has been deserted for upwards of a century. The present town formerly extended far beyond its present limits. The former inhabitants are now scattered in small villages in the neighbourhood, where they find themselves much safer from attacks than when living close to their Chief.

There are three large lakes within a mile of the town, containing large numbers of duck and teal. Hare and partridges are very plentiful, though the former are killed in large quantities.

January 29th, Sunday.—The Tsaubwa sent over to say that news had just been received that the rebellion in the Monai District had spread northward, and that a large body of rebels had arrived at the Maing Noung Frontier (our intended route lay through the principal town of this district); in consequence of this, he wished me to proceed by the Maing Kaing Road, more especially as an ill feeling had long existed between his people and those of Maing Noung, and large bodies of men were still stationed at their respective frontier posts. The Tsaubwa also wished us to remain four or five days longer, in order that more reliable information might be obtained of the movements of the rebels.

We agreed to change our route, but not to prolong our stay.

January 30th, Monday.—To Maing Kan Village, distance 8 miles. The road followed along the western side of the plain. At 2 miles passed the large Bazaar of Bom Pon, in the vicinity of which there are said to be several villages.

January 31st, Tuesday.—Crossed the western range of hills by a rather difficult road for elephants. At 6 miles reached the highest point, where a boundary pillar marks the division between the Laigyah and Maing Kaing Districts. Two miles farther on reached a small village called Kin-Yua, where there is a small outpost from the chief town. Encamped in some paddy-fields below the village.

Direction of march N. N. W.

February 1st, Wednesday.—By a good road to the town of Maing Kaing, distance 10 miles, crossed several small valleys, extensively cultivated, separated from the large Maing Kaing one by small hills. Marched up the chief valley for 3 miles, and encamped about 1 mile to the north of the town in a large zayat.

The Myooke was encamped a short distance outside the town, with a body of 300 men. He is under orders to march to the disturbed part of the Monai District. The town contains about 100 houses. A large manufacture of pottery, consisting of goglets, pans, jars, and cups, some of excellent design, is carried on here. Provisions of all sorts is very plentiful. On the hills bounding the valley live a wild tribe called Paloungs. They cultivate the poppy extensively in their toungyas. The manufactured opium sells in the town for Rs. 15 a viss.

February 2nd, Thursday.—In a northerly direction up the valley for 3 miles, passing several large villages, crossed a few small hills, and en-

camped in a small valley on the Thein Choung near the village of Bantsaik, distance 7 miles.

February 3rd, Friday.—One of our party being very unwell, we were obliged to halt for the day.

February 4th, Saturday.—Marched 9 miles to the village of Mahmon. Encamped amidst a fine clump of bamboos near a tank. For the first 3 miles the road followed along the left bank of the Thein Choung, and for the remainder of the distance winded round several small hills, on the slopes of which were several toungyas ready prepared for burning.

February 5th, Sunday.—Halt.

February 6th, Monday.—To Kyai Houng, distance 10 miles. Road very level the whole distance. At 8 miles reached the boundary between the Maing Kaing and Bansan Districts. Villages very numerous towards the end of the march. A hot spring occurs close to the road near the boundary of the districts in which the thermometer rose to upwards of 100°.

February 7th, Tuesday.—The road passed in an easterly direction through one of the most beautiful valleys we have yet seen. The villages passed were very numerous. Encamped near a large stream on the south side of the town of Ban San, distance 6 miles. There are numerous hot springs near this spot, in one of which many of our men bathed. The town itself consists of not more than 30 houses, but the bazaar outside is very large, and the adjacent villages numerous. A Tsaubwa resides here, but as he was engaged at a Pagoda some distance off, we did not see him. From his people we obtained good information regarding roads. We have the choice of several. The one our Nakan wishes us to take lies in a N. N. W. direction to the town of Lah-sho, the residence of the Tseetkai, of the Theinnee District, distance said to be 100 miles. In consequence of the late disturbances in that district, caused by one Tsanhai who drove the Tsaubwa out of Theinnee, and now remains in possession of the town, it is impossible for us to take the route laid lown in the Royal Pass. Now as it is time for us to shape our course in an easterly direction towards the Salween, I do not consider it advisable to make any further westing, especially when it is considered that the Tseekai would not allow us to enter the parts of the district when Tsanhai still retains his influence, and would probably direct us to the river in a S. E. direction. As I can hear of no good roads in a N. E. direction from here, I am induced to proceed to the town of Maing Shoo, which is said to be 50 miles to the east of this, and only two marches from the Salween.

February 8th, Wednesday.—In a direction E. 15° N. to the village of Heintone, distance 8 miles. The road was well beaten, and apparently there was much traffic thereon. Encamped on a small stream near a large bazaar. Noticed for the first time a race of people called Yinnees. They are in appearance like Toungthoos. The peculiarity in the women's dress consists of broad bands of wire fastened round their waists. As

these are fastened very tightly over their dresses, I fancy that a change of clothes is a rare occurrence with them. The race of Yins are said to be very numerous. There are three tribes of them speaking different languages, viz., Yinnees, Yinnets, and Yinbans.

February 9th, Thursday.—Proceeded in a direction E. 20° N. to within one mile of the village of Kyeing Lin, where a grand pooay on the occasion of offering gifts to the Phoongyees was being held. About 10,000 people were encamped on a plain outside the residence of the chief Phoongyee of the district. Shortly after our arrival, the Kyeing Lin Tsaubwa, accompanied by his wives, paid us a visit, bringing presents of provisions, &c. He appeared to enjoy his visit very much, and before leaving begged of us to halt the next day, for he expected the Banwut Myooke and several other officials to arrive in the course of the evening. Now, as the Banwut Myooke is the head of this district, it will be as well to meet him. He is a Burman, and a protegé of the Magway Mengyee (one of the ministers of the Mandalay Court).

February 10th, Friday.—Early in the morning received a visit from the Myooke. He was very affable in his manner. He strongly urged us not to proceed any further towards Maing Shoo, assuring us that the rebellion in the Theinnee District had been quelled, and that if we went to the Tseekai, he would send us on to Theinnee, from where we could reach the Salween by a good road. He called some of his officials and asked them about the Maing Shoo road. They all pronounced it impracticable for elephants and bullocks. The Myooke further stated that Lahsho, the residence of the Tseekai, was only eight marches distant to the N. E. He wound up by saying, "If any thing that I have told you of is not perfectly true, report me to the Magway Mengyee, for he is a minister who detests deceit." (As it afterwards turned out nearly every thing that he told us was false). The Myooke's statement regarding the roads, and the state of the Theinnee District, differs greatly from what we have previously heard, and I am at a loss how to act. From former experience, I am convinced that if we take a route that is not approved of by the Burmese officials, we can expect no assistance at the river bank. The Nakan's written instructions to the effect that we should go to the Theinnee Tseetkai evidently have a great weight with all. Our Nakan left us on the 9th and proceeded to the Myooke's town, where, after doubtless consulting with the Myooke, he has remained. All things considered, I determined to proceed to Lahsho. There is a caravan of Chinese traders here from Talee, the chief town of the Shan Tayoks. They brought down about 70 mules laden principally with straw hats, carpets, copper vessels, bees' wax, honey, and walnuts. These straw hats were selling at the Pooay ground from Rs. 4 to 8 each. The headman told me that he had already sold 400. After breakfast, visited the Myooke and Tsaubwa, who were encamped amongst the thousands who had come in from the surrounding districts to make offerings on this day, which is the full moon of Tabodwai. Afterwards

walked through the bazaar, and visited the Chinamen's stalls, also the presents for the Phoongyees which were very tastefully arranged on stands of filigree work, and on miniature pagodas in the Kyoung enclosure.

February 11th, Saturday.—Marched in company with the Myooke to Banwut, where he resides. He tried hard to induce us to halt here, but having marched only 5 miles, we were obliged to move on. Crossed a large stream, the ford was rather deep, and some of our bullocks' baskets were wetted. Found our Nakan taking it easy in the Myooke's house. He had evidently made up his mind that we would be persuaded to take this road. Halted at Maing Tha, where there are some good zayats in the enclosure of a Phoongyee house, distance 10 miles, direction W. 40° N. Went out shooting near the village. One of the villagers came out to witness the sport, I showed him my gun, and he appeared much astonished at the way I shot several imperial pigeons. The man carried a long bamboo, and seemed to be slightly intoxicated. As I was turning off the road to go back to camp, he made a blow at me with the bamboo. I instinctively lowered my gun from my shoulder with no other intention than to guard the blow. The man immediately ran off to the village, calling out that I had attempted to shoot him. The people of the village, to the number of 30 or 40, turned out with guns, spears, and sticks, and approached the zayat, where we were staying in skirmishing order. I kept most of the men inside the zayat, and remained myself outside. The headman of the village and the Nakan shortly afterwards came up, and after some difficulty, succeeded in appeasing the rabble. Some of the villagers were one time on the point of coming to blows. After they had dispersed, the headman came and begged of me not to take any further notice of the outrage, which they excused on the plea that they had had a grand feast in their village, and all the people were drunk. I mention this to show what a lawless race the Shans of these parts are, and how exceedingly careful it is necessary to be, in order to avoid giving them offence.

February 13th, Monday.—At 4 miles passed the large village of Banmau. Marched on for 8 miles further, and encamped in the jungle near a small stream.

February 14th, Tuesday.—To Ootee, distance 11 miles. At 8 miles reached the high road leading to Theebau, which is said to be distant five marches. From this point our Nakan turned off from the high road we had been following, and passed to the west of the village of Banzin. This proved to be anything but a short cut, (as the Nakan called it,) for we twice lost our way.

February 15th, Wednesday.—Descended to a large plain and passed several large villages. Halted 3 miles beyond Maing Tseit, near the Noh-wee Kyoung, in the enclosure of which we encamped. Since leaving Banwut, we have been marching considerably to the west of north, though the Myooke assured us that the Tseetkai's town lay to the eastward.

February 16th, Thursday.—The road to-day was very difficult for our cattle. At 8 miles crossed a deep stream by a very ricketty bridge over which we had the greatest difficulty in driving the bullocks. The elephants took a long time in picking their way amongst the large slippery rocks on the bed of the stream. As we were in want of rice, we were obliged to continue our march to the village of Hotee, distant 13 miles.

February 17th, Friday.—At 3 miles crossed a large stream that runs into the Myik-ngai; one mile further passed the large village of Bansai, after which we gradually ascended for nearly 5 miles, till we reached the village of Toung-tate on the top of the range that bounds the south of the Lahsho Valley. Here there were signs of the fighting that has lately been going on in this part of the district. In the village itself was a small earthwork, and at the narrow passes of the hills we ascended to-day were similar defences. Several villages that we have passed during the last two days were completely deserted. Distance of march 9 miles.

February 18th, Saturday.—To the residence of the Theinnee Tseetkai, distance 10 miles. Encamped about 1 mile to the south of the stockade. All round about are the skeletons of the Shans and Burmese who fell in the severe fighting that took place here about three months ago. The Theninee Tsaubwah being driven out of the town by the rebel Tsanhai or Shinhai, as he is called by some, came and took refuge here with the Tseetkai. Tsanhai sent a large force of Shans and Kakhyens to attack them. The Burmese troops, said to number 500 men, together with the Tsaubwa's men, were starved out by the rebels, and were forced to beat a hurried retreat, leaving all their sick and wounded behind. Upwards of 500 men are said to have perished in this valley. The town of Theinnee and all the adjacent villages have been burnt to the ground. Tsanhai has sent presents to Mandalay, together with a letter stating that he has not been fighting against the Government, but merely with the object of turning out Moung Pho, who is universally detested. Matters are at present quiescent, pending the negotiations going on between Tsanhai and the Government, through the

February 19th, Sunday.—Visited the Tseetkai, who is an old man, about 70 years of age. He was for 10 years Tseetkai of Monai, and before the appointment of Governor of the Shan States was made, (16 months ago,) he was the head official in the country. He treated us with great courtesy, and advised us to proceed to the Salween by a road to the eastward, as it was inexpedient that we should pass through that part of the district where Tsanhai retained his influence.

There are 1,500 Burmese troops stationed here at present, 500 guard the small stockade in which resides the Tseetkai, and the remainder with other two officers are in a large stockade to the northward, about 1 mile distant.

February 19th, 20th, and 21st Sunday, Monday, and Tuesday.—Halted. Visited the Tseetkai again the day before leaving. He men-

tioned that during the time he resided at Monai, he made frequent inquiries regarding the Salween River, with a view of ascertaining whether it was navigable between that town and Theinnee, but he received such accounts of the dangerous nature of the rapids, that he gave up the idea of sending persons to descend the river on rafts from Theinnee. Had the river been practicable for either rafts or boats, he very truly said that the fact would have been known long ago, and that the Chinese traders would, if they could, bring down their merchandise from the frontier to the Monai District. The Tseetkai promised to send a Myooke to accompany us, furnished with the requisite orders in Shans and Burmese, so that we might experience no difficulty in obtaining whatever assistance we might require from the heads of villages, &c.

February 22nd, Wednesday.—Marched to the village of Maingtin, distance 7 miles. Here there is an outpost of Burmese troops from Lahsho, numbering 100 men. This village was burnt down by Tsauhai's people some three months ago, and the unfortunate inhabitants are living in small huts of straw in the paddy-fields.

February 23rd, Thursday.—Road as yesterday, very good. Passed several deserted villages, the inhabitants of which are said to be hiding in the jungles pending the settlement of Tsanhai's business, for they do not feel at all sure that hostilities would not be renewed, and they are too weak to defend themselves. Halted at the large village of Maingyin, distance 9 miles. This valley is thickly populated, and during the late rebellion, the people erected stockades, and made such a show of resistance that they were unmolested by the rebels.

February 24th, Friday.—Maingyau, distance 11 miles. This is now the largest town in the district. It is situated at the foot of a range of hills running nearly north and south, one of the prettiest valleys we have yet seen. The villages in the neighbourhood are very large and numerous. The Tamfong, head Shan of the village, who paid us a visit shortly after our arrival, mentioned that in case of a disturbance he could collect 1,000 men in a few hours.

February 25th, Saturday.—As this is bazaar day, and we shall see no other town for a long time, we halt for the purpose of buying in supplies.

February 26th, Sunday.—This afternoon a letter addressed to me arrived from Tsanhai, the rebel Chief at Theinnee. It stated that as it was directed in the Royal Order that we should proceed to the Salween River to the east of Theinnee, it was not proper that we should continue our present route. There were wild tribes near the Salween with whom he, Tsanhai, had influence, who would certainly attack us if we went on. In other words, Tsanhai says with the wild tribes near the Salween I have influence, and that influence I will not use to prevent your being attacked. The Tamong must also have received some communication from Tsanhai at the same time, for though he had before promised us every assistance, he now refused to obey the Tseetkai's order, not only to

accompany us himself, but also to send a party with us to the next village. Our Nakan and the Myooke agreed that Tsanhai was annoyed at the Tseetkai ignoring him altogether, and dissuading us from going on to Theinnee, and that he would certainly issue such instructions to the Ka-khyens living near the river as would prevent our obtaining any assistance from them, if he had not gone as far as to order them to stop us by force. An express was sent off to the Tseetkai at Lahsho, and he also gave his opinion that it was inexpedient for us to go on. We therefore returned to Lahsho. Immediately on arrival visited the Tseetkai, who seemed very sorry at what had occurred. He mentioned that under present circumstances his authority could not be said to extend beyond the stockade. None of the heads of villages would come in to him, all were waiting to see how Tsanhai's negotiations with the Burmese Government terminated. As the Tseetkai and Tsanhai are known to be enemies, they are unwilling to compromise themselves by declaring openly for either party. The Tseetkai advised us to try some of the roads to the southward. He promised us orders to all the heads of villages, though he did not know that they would be obeyed. As some of our elephants are knocked up, and our bullock men whom we engaged only to Theinnee refuse to accompany us any farther, we determined to send all our heavy baggage to Mandalay, and to proceed ourselves to the river with about 20 cooly loads on elephants. The Tseetkai said that he would try and engage coolies for us, but after waiting for three days we were informed that in consequence of all the surrounding villages having been destroyed the people were not willing to leave their families whilst matters continued in the present unsettled state. What with trying to engage coolies and arranging to send our heavy baggage to Mandalay, we were detained at Lahsho till the 6th March. We find it necessary to march back four days' journey to Banzin. From there we will make our third attempt to strike the Salween. Left Lahsho on the 6th, and arrived at Ban-zin on the 10th March. The Tamong of the village visited us shortly after arrival, and procured us a few coolies. The headmen of all the villages we have passed through since leaving Lahsho have promised to provide us with coolies, but invariably as we were about to start sent to say that they were not procurable.

March 11th, Saturday.—To Maingyai, distance 8 miles. This is a large village with a fine bazaar. Encamped outside a Phoongyee house near a large tank of water on the south side of the town. The Tamong was absent at a Pagoda about 15 miles distant. In the evening one of his relations came over to tell us that they expected to be attacked that very evening by the men from the neighbouring district, and that we should not be alarmed if we heard firing. "The people of the district expected to attack could only muster 500 muskets, whereas Maing-yai could muster 1,000, so there would be no doubt as to the result." Shortly after leaving us several muskets were fired. This was taken up by the surrounding villages, and during the night armed bodies of men came pouring into the Tamong's village. The cause of all this excitement was that some

buffaloes had been stolen and traced to the Maing Yai district, and on restoration being demanded, a dispute arose as to whether the tracks found were those of the stolen buffaloes or not. In some parts of the Shan States these kind of disputes are of frequent occurrence, and they generally end in one village attacking another.

March 12th, Sunday.—Early this morning the head Shan came and informed us that there was no chance of their fighting for some days to come, as the matter was then under negotiation. Large bodies of armed men, however, remained in the village during the day, and several small earth-works were thrown up near the different approaches.

March 13th, Monday.—To Man Pai, distance 15 miles. There was no good halting place on the road, so we were obliged to make a long march. Halted on the bank of a large stream close to the village.

March 14th, Tuesday.—Marched 8 miles to some paddy-fields, 2 miles beyond the large village of Ban Pon. Road very good, and villages passed numerous.

March 15th, Wednesday.—Crossed small range of hills in an easterly direction, road difficult for elephants. In a distance of 6 miles did not once come across water. Halted on the bank of a large stream, 2 miles beyond Looai Shing, distance 9 miles.

March 16th, Thursday.—At 6 miles passed the large village of Kahdouk, where there is a fine bazaar; 3 miles farther on crossed the Bin Choung. The water was nearly 4 feet deep at the ford. Halted at Maing Kah, 3 miles farther on. In the afternoon sent over to the Tamong for guides to conduct us the next day to Maing Loon, the residence of the Tsaubwah of the District. The Tamong said that to-morrow being bazaar day, the Tsaubwa himself would came to Maing Kah, and that without the Tsaubwa's orders, he could not provide us with guides.

Shortly afterwards the Tamong's brother visited us, and on protesting against the delay, and producing the Tseetkai's orders in Shan, he made the astonishing statement that nobody in the village could read the Shan language. (The Tamong himself read it fluently enough the following day.)

March 17th, Friday.—There being no help for it, we were obliged to halt to-day. About 1 P. M. the Tamong, accompanied by a Shan sent by the Tsaubwah, visited us. It was said that the Tsaubwa himself was too unwell to come to Maing Kah, but that he had instructed the Tamong to communicate his orders, which were that we could not be allowed to go down to the Salween through the town of Maing Loon; the only reason given was that the road was not a good one. We explained that we had no intention of taking our elephants to the river bank, but that we wished to go with our coolies by the road through Maing Loon, by which traders were in the constant habit of going. We showed him our Royal Pass and the Tseetkai's order. On reading the latter, he appeared much amused, and on our mentioning that the

Tseetkai had directed us to the town of Maing Loon, he said "I do not understand why you wish to take the road through the Tsaubwa's town, when there is a much better one to the southward. The Tsaubwa's orders are that you take the south road, and it is of no use talking any more about it." Finding that further argument was useless, we asked for a guide to take us by the road named by the Tsaubwa. The Tamong said "you can have one, if you pay me 6 tickals of silver." Though it was a regular imposition, I was obliged to produce my Rupees; the Tamong at the same time produced a pair of scales and weights, and ended by making me hand him over Rs. 8¼. From subsequent inquiries made, ascertained that the Tsaubwa arrived about noon, and stopped in the jungle near the baazar; also that the reason why he did not wish us to visit him was that he is building a strong fortification round his town, which he does not wish our Nakan to see. No Burman official has ever yet entered Maing Loon, the Tsaubwa of which pays no regular tribute to the Burmese Government. I was told that, had we been by ourselves, every civility would have been shown to us. Here we are within three easy marches of the Salween, and balked for the third time.

March 18th, Saturday.—Marched nearly due south for 11 miles to the village of Ho-nam, and encamped on a stream that runs from under a hill close to the village. This was the only drinkable water met with since starting this morning. Road very hilly. Saw nothing but Toungya cultivation.

March 19th, Sunday.—Road level and good till we reached the village of Ban Looai; crossed a high hill beyond, and encamped in a small open space of ground in the midst of the hills. Distance 10 miles.

March 20th, Monday.—To the village of Hotee, distance 6 miles. We had intended to march on 4 or 5 miles farther, but the Tamong of the village said that we must sleep here one night, for the Maing Loon Tsaubwa had sent him an order that he was to send on men with us to the river bank, first ascertaining whether the road was open, if not, to have it cleared. (This is a mere excuse to detain us in order that the villagers may have an opportunity of seeing us.)

March 21st, Tuesday.—Started off with the Tamong's nephew as our guide; ascended about 800 feet in a distance of 3 miles to the village of Kanpon. From here there was a very long and steep descent to the Salween River, which we reached at a point about 6 miles from this village. Close to where we first saw the river, the stream ran with great velocity between two large masses of rock, and was narrowed (as we afterwards measured) to 96 feet. We encamped about half mile beyond this, up stream, at the Tsooloke Ferry. On both sides of the river here there is a back water, the breadth of which is 100 yards. Bullocks swim across here with ease. During our stay we saw three batches crossed. The loads are of course carried in boats. A ferry rate is here charged of one tickal of silver for 5 bullock loads and one anna for each person. The ferry belongs to

the Mau Pwah District, the Tsaubwa of which lives on the east bank of the river at the town of Banpan, said to be about 16 miles distant. This Tsaubwa has a narrow strip of territory on the west bank of the river, about 10 miles in length.

March 22nd, Wednesday.—The head Shan of a village near which we passed yesterday brought us a present of some rice and four coolies that I had asked for. Shortly afterwards a man from the Tsaubwa's village made his appearance. He made many inquiries regarding the object of our journey. I gave him some presents, and he went away promising in the evening to send us over four coolies. In the evening received a message to the effect that we must not cross the river until orders had been obtained from the Tsaubwa. During the day I crossed the river and went to the Oo-Noung Bazar, about 2 miles up the river. Here I saw a great variety of European manufactured goods exposed for sale, including silk and cotton kerchiefs, muslins, long cloth, needles, thread, and cutlery, and selling at about four times the Rangoon prices. In a small village close by were stored large quantities of cotton. This is mostly bought by the Shan-tayoks who live on the borders of China. Two days ago we met 100 bullocks laden with cotton on their way to Talee, the chief town of the Shan-tayoks. The cotton is grown by the Kakhyens and Lawas, who live on the neighbouring hills. I saw several Lawas in the bazaar; they are a very wild looking race of people. They wear short uncombed hair. Their sole dress consists of a small waist cloth.

The Kakhyens, who are more numerous farther north, are equally wild in appearance and scanty in dress. I also saw in the bazaar a race of people called Motsoos. They are in appearance like the better class of Karens living in the plains of British Burma. Their dress is very becoming. It consists of a black cloth jacket, embroidered at the cuffs and collars, black Shan trousers, and a gaily coloured turban. I brought four of them to our camp and made them small presents. They say that they are an independent race under a Chief of their own, and that they resided to the N. E. about a fortnight's journey from here. They could only talk a few words of Shan, so there was difficulty in communicating with them.

March 23rd, Thursday.—Early this morning, the ferrymen, after crossing over several bullock loads, took their raft to pieces. It consisted of a platform of bamboos placed across two boats fastened together. I imagine that this was done as a hint for us not to cross. Having waited till one hour past noon, and receiving no message from the Tsaubwa, as was yesterday promised, we secured one of the boats and commenced crossing over our baggage. The ferrymen said that they did not object to our using their boats, but that they would rather not assist us themselves. I must here mention that finding it impossible to go down the river on rafts, or for our elephants to follow along the river bank, we determined on the day of our arrival to send back our elephants one march

to Hotee, thence by Maing Shoo and Maing Noung to Laigyah, and to proceed ourselves for a week or ten days along the river bank, visiting the various rapids that are said to exist. An insurmountable barrier of rocks is said to stretch across the river at no great distance below this, so there would be no particular object gained in taking a section of the river at this point, even if it were possible, which I doubt; for, from the experiment already made, it appears that the lead cannot be got to the bottom in consequence of the great velocity of the current.

We are, moreover, running short of rice, and not having a day to spare, we are compelled to push on. In the evening the headman of a village in the Mau Pwa District came to our camp. As soon as he ascertained that our Nakan would accompany us no further, he gave orders to the ferrymen to re-construct their raft and cross over the remainder of our baggage.

March 24th, Friday.—After marching along the river bank for about 3 miles reached a rapid where the water ran with great velocity for a distance of about 100 feet. The fall was, I should think, about 3 feet. Below five distinct waves were formed. One mile further on came to what is, without doubt, an insurmountable obstacle to the navigation of the river.

An enormous mass of rock about 50 feet high stretches across the river; the water finds its way through five small passages. The opening on the west side is the widest, about 25 feet, but on the side of this small channel appears the top of a sunken rock, so I doubt if there is sufficient depth of water for a breadth of more than 18 feet for the passage of a boat; but as the water rushes through this passage obliquely, being reflected by a large rock in the middle of the river, I doubt if any description of boat could pass through. For the next 3 or 4 miles we went up and down very steep hills, though the distance of the march was not more than 7 miles, we did not arrive at the village of Maupwa till late, for we went down to look at the river from three or four points, the descents being very steep and difficult. At Maupwa resides a nephew of the Tsaubwa's. He sent a Shan out to meet us, but he could not make up his mind to visit us the day of our arrival, but wanted us to halt the following day.

March 25th, Saturday.—Marched along a most difficult road for 8 miles till we reached the Maingshoo ferry. Only twice caught sight of the river in the distance. In the evening moved on 3 miles farther to the large village of Banpan, where resides the Maupwa Tsaubwa.

March 26th, Sunday.—Requiring fresh coolies and guides, we sent a message early in the morning to the Tsaubwa. He sent back word that he would visit us in the evening. He however did not do so, but sent his son with a request that we would halt the next day, in order to give the Tsaubwa an opportunity of paying us a long visit.

March 27th, Monday.—We were again obliged to halt much against our will. About 9 A. M. the Tsaubwa came down to our camp accom-

panied by five of his wives. Having shown him everything that we had, he expressed a desire to see us eat our breakfast. It being then past 11, we were perfectly willing to gratify him. After breakfast he retired to a zayat close by, as he said, in order that he might have a long look at us. He made us several presents, for which we made a suitable return. He mentioned that when he first heard of our arrival, he felt very uneasy in his mind, not knowing the object of our coming, but since we had explained everything to him, he was very glad indeed to see us, and hoped that we would remain three or four days.

From inquiries made, finding that it is impracticable to start from here by rafts, we intend to march along the river bank for some distance, and, if possible, go down by rafts to the Takkau ferry, on the borders of the Monai district.

March 28th, Tuesday.—After marching along the river bank for one mile, came to a very awkward obstruction. A mass of rock 50 or 60 feet high stretches half way across the river (width of river above and below about 250 feet). The whole force of the stream dashes against it, and a strong back-water is formed on the opposite (left) bank. At the upper extremity of the back-water a large shoal is formed, so a boat going down stream would be obliged to keep well on the right bank, and when within 20 or 30 yards of the rock steer towards the left bank. The chances are, however, that the immense force of the stream would draw it on to the rock. A small boat or raft might be dragged by ropes through the back-water. Three miles farther on came to a spot where three rocks run out about one-third of the way across the river from the left bank. Looking up-stream, five small rocks about 10 feet above water appear. There is a sufficiently wide passage between them of 70 or 80 feet. A short distance above and below these masses of rock, the river turns off at right angles. The current is not strong at present, but during the rains it would be a very difficult place to navigate, in consequence of the many short turnings round the rocks. After marching nearly all day, and only making 8 or 9 miles, halted opposite to the village of Bantsoot. The road was very bad, and our coolies had the greatest difficulty in getting along. In some places a false step would have precipitated one down a clear drop of 50 or 60 feet to the rocks below. In the evening the head man of the village came across to see us. He mentioned that if we continued at the rate we had been going to-day, we would not reach the Takkau ferry under 10 days, whereas on rafts we could get down in 2½ days. He offered to go and consult with the people of his village, and let us know in an hour's time, whether any were willing to venture down on rafts at this time of the year. About 8 P. M. he returned, and after a little bargaining, we came to terms. It will be necessary for us to halt two days.

March 29th and 30th, Wednesday and Thursday.—Engaged during the whole of these days in constructing two rafts. The larger consisted of 42 large bamboos, and was 60 feet long by 18 feet broad. The smaller

50 feet by 15 feet. On each was a platform raised 3 feet in the centre of the raft.

March 31*st, Friday.*—At starting some of our Shan coolies hesitated to get on the rafts. They had never before been down the river, and a very ugly looking rapid throwing up clouds of spray was visible in the distance. After a little persuasion we got all on board, and in a few minutes were shooting the first rapid. We went at railway speed for a few seconds down a regular slope, then the raft entirely disappeared under the water, the raft men being covered up to their waists. The water splashed up through the flooring of the platform and wetted some of our baggage. The second rapid, a few hundred yards below, was the worst. We appeared to go down a drop of about three feet, and then over a large wave, into the trough of which we had no sooner descended than a second wave broke over my side of the raft, dashing the water into my face. I was then sitting three feet above the raft. We shot four other rapids that to look at from the shore, I should have thought that a raft could have gone down in safety. The most dangerous place of all however was at a broken line of high rocks across the river, through which there were 3 passages. We took the centre and narrowest one, because the enormous strength of the current through the side channels would have drawn us on to some rocks below. Through the centre opening we shot like lightning, grazing the rock on one side, and not having more than 10 or 12 feet to spare on the other. A short distance below this we passed a large stream called Namkah-Choung that runs past the town of Kyeington on the east side of the river. For the next 8 or 10 miles the water ran swiftly and smoothly, with the exception of one rapid about half mile in length, close below the Namkah-Choung, on which however the waves rose to no great height. During the day we must have gone down nearly 40 miles. Halted for the night on a small sand bank near the village of Tonhon.

April 1*st, Saturday.*—Down the river, for 20 or 30 miles to the Takkau ferry, might have gone the whole distance with perfect safety in a canoe. Villages very numerous on both banks. The Takkau ferry is situated in the Samoot district. The head official (a Burman) resides at a village on the river bank a short distance above this. This district is again under the Weelat-Won, a son of the Governor's, or rather the ferry collections which amount to a large sum every year are paid in to him. The districts about here are most curiously divided. On the west bank, where our raft men came from, was the Maing Noung district, and on the opposite bank, the Maupwa district. Twenty miles lower, on the west bank, came the Sauoot, and on the east bank the Keington district. Again, below Takkau, comes again the Maing Noung, and a few miles below, the Monai district.

April 2*nd, Sunday.*—Went down the river in a canoe for 12 miles to visit a large rapid, down which it is said that no raft can descend. Shortly after starting, the river widened out to about 1,000 feet, and varied between that and 500 feet till within about half mile of the

rapid, where it narrowed to about 250 feet. Five hundred yards above the rapid the stream runs like a sluice, and when within 100 yards goes down an incline, at the bottom of which it appears to strike against a sunken wall of rock, for the river rises up in one enormous wave, about six feet high, and curves backwards in a sheet of foam. I sent a portion of a raft that I found near down this rapid; it disappeared altogether for 10 seconds and came up some 50 yards below, end uppermost. It however righted and floated down the stream. From inquiries made ascertained that there are five rapids between this and the Karenee Frontier impassable for rafts at this time of the year. The disturbances in the Monai district and the lateness of the season will not however allow us to visit these. The Monai district is at present over-run with dacoits, and there is no likelihood of the rebellion being quelled for some time to come. Had we not seen so many insurmountable obstructions in the river, I would have pushed on at all risks through the Monai district; but as the question of the navigability or otherwise of the river above the Monai district is pretty well settled, I think that the state of the river lower down, may, from all the information I have collected since reaching the river bank, be assumed to be as bad as what we have ourselves witnessed in the 80 or 190 miles we have descended the river. I may here mention that at present the river is at its very lowest; in a few days it is expected to rise; in fact it did so slightly last night. During the height of the rains it is possible to go down from here on rafts to Dahquintsike, about 50 miles above the Hatgyee; between Theinnee and Takkau it is impossible to do so at any season of the year. The rise of the river during the rains is in some places as much as 80 feet.

April 3rd, Monday.—At starting had a very tedious ascent to a height of above 2,000 feet. Descended very slightly, and after passing two small villages, halted at a Khyoung, near the large village of Pinnier in the Monai district and within 100 yards of the Maing Noung district, the two being separated by a large stream. Only during the last 5 miles of our march did we cut across a corner of the Monai district. We will not enter it again. Length of march 10 miles; direction west.

April 4th, Tuesday.—To Konheim on the Bin Choung, the stream that we crossed on the 16th ultimo. It is here nearly 300 yards broad, the stream running very slowly, and being very shallow in places. About quarter mile farther up, the channel is greatly contracted, and there is a fine water-fall with a clear drop of five or six feet. Below there are said to be a great number of rapids. The road along to-day's march (12 miles) was good.

Three small hills were crossed. At 4 miles passed the large village of Kahlooai, where resides a Tamong. The Konheim Tamong paid us a long visit in the evening, and was very civil in providing us with guides and coolies without any delay.

April 5th, Wednesday.—Passed numerous villages on the road, the largest of which was Laikan; road good the whole distance. Halted at

the small village of Thaimon, distance 13 miles. Water about half mile distant.

April 6th, Thursday.—Along an excellent road to the town of Bansein, the second largest town of the Maing Noung district, there is the largest bazaar here that we have yet seen. It is said that since the destruction of Laigyah, this place has greatly increased in importance. Three large roads meet here, from Maing Kaing, Maing Noung and Laigyah. Cultivation all about most extensive and villages numerous. Encamped in the bazaar near a fine stream of water; distance of march 12 miles.

April 7th, Friday.—Road and appearance of country much the same as yesterday. After marching 4 miles entered the Laigyah district. Halted at the village of Pashee near a large well, from which the people for a long distance around draw their water. Length of march 14 miles.

April 8th, Saturday.—To Laigyah, distance 16 miles. Here we met our elephants that we had sent on from the Salween viâ Maingshoo and Maing Noung. The road from Maingshoo to Laigyah is described as an excellent one for carts. The same may be said of the one we have come along during the last two days. At 2 miles from Laigyah crossed the Maing Khaing stream that runs into the Ben Choung.

April 9th, Sunday.—Halt.

April 10th, Monday.—Left Laigyah this day and returned by nearly the same road that we came as far as Taithone, which we reached on the 16th instant. From here we marched to the town of Pooayhla, and thence down to Burma Proper, striking the valley of the Irrawaddy at the large town of Hline Dek on the 21st April. From Hline Dek made the town of Yemaithin, a distance of 30 miles in two marches. Halted for rest at Yemaithin for two days. This is the first halt we have made since leaving a distance of 150 miles. The Hline Dek road is said to be the best from the Shan States to Burmah Proper. It is however, in my opinion, little better than the south or Tsin-doung road that we took on our way up. The centre or Tapyay road is said to be the worst, and the one least used by the Shan traders. On the Hline Dek road there is certainly only one very large hill to cross, but then for nearly one entire march, the road follows the course of a large stream, dry at this time of the year. The bed of this stream consists of large loose boulders of rock, the passage between some of them being scarcely sufficient to allow a loaded bullock to get through; during the rains this road is of course impassable.

There is one other road that may be mentioned, and that is the one from Toungoo to Mobyai, through the Gaiko country. As I have stated in former reports, if the valley of the Mobyai could be reached, there would be little difficulty in constructing a tramway from there to Theinnee; but from inquiries made both this season and last, I am convinced that this road is worse than any of the other four by which I have

passed to and from the Shan States. The direct Mandalay and Theinnee route I also believe to be impracticable.

Left Yemaithin on the 26th, arrived at Ningyan on the 29th April, and Toungoo on the 6th May, having been absent exactly five months, during which time we marched upwards of 1,000 miles. As a proof of the healthiness of the climate of the Shan States, I may mention that during the journey scarcely a single case of sickness occurred amongst our party until the rains came on towards the middle of April.

(Signed) C. E. WATSON, CAPTAIN,
Asst. Commr., British Burmah,
In charge of the Salween Expedition.

SHOAY GHEEN,
20*th June* 1865.

REPORT

ON THE

Nature of the Country passed through by the Expedition to the SALWEEN, *and the result of the observations at the river as to its* NAVIGABILITY: *with* METEOROLOGICAL TABLES *and a* ROUTE-MAP.—*By* FRANCIS FEDDEN, A.R.S.M., *Geological Survey of India.*

Starting from Toungoo,* in Latitude 18° 56′ north and Longitude about 96° 30′ east, we proceeded in a northerly direction up the west side of the valley of the Sittang, towards the town of Nyin-gyan. The road from Toungoo through Lay-doung and Toung-yeo-galay bears a little to the west of north, passing over an extensive alluvial spread cultivated with rice; from Toung-yeo-galay, the road, winding a good deal, has a general bearing rather east of north to Myo-hla, the frontier Police post village, a distance of 35 miles from Toungoo, and 5 miles short of the boundary pillar.

About four miles from Toung-yeo-galay the Swá-khyoung is crossed, a broad stream with steep alluvial banks; and a short distance beyond the road passes over "Endain" ground,—fine sands, argillaceous, mottled, also gravelly, and ferugenous in places where imperfect laterite is forming.—This undulating sandy country extends westward to the foot of the Pegu-Yeoma hills, distant about 15 or 20 miles, while to the east, the flat paddy land spreads out to the base of the high range beyond the Sittang River. The road continues passing over, or skirting along the sandy ground, descending occasionally on to the alluvium.

Rather more than a mile north of the pillar we pass the first Burmese out-post called Em-ben-yay-dwet; crossing a small stream and its valley we ascend on to a plateau of fine white sands with here and there laterite gravel; at about 5 miles north of the pillar the road turns to the west and north-west, over undulating country,—arenaceous waste land,—till within a short distance of the Thongdan-goo Tsakahn ("halting place") on the bank of the Thongdan stream, a tributary of the Sittang; here we are on low level fertile land that extends along the banks to the great alluvial spread in the main valley; and from this "Tsakahn" to Nyin-gyan-Myo, a distance of about nine miles in a N. N. E. direction, the greater part of the ground is under rice cultivation.

Nyin-gyan is not apparently a large town, for the Governor of the district, who resides here, had lately removed the town from the north to the south and higher bank of the Kyouk-khyet stream, and many of the inhabitants had not yet built up houses. The Kyouk-khyet is a very broad bedded stream, but in December the water was quite shallow; about 6 miles down it joins the Tsen-they or Shway-Myo, a larger stream, that flows into the Sittang at Tsenthey-wa-yua. Here at Nyin-gyan much teak timber was lying about, and it was reported that there were some thousands of logs in the stream, but owing to the partial draft last season, it could not be brought down.

* Or more correctly Toung-gnoo.—For Orthography, vide reference on Map.

Crossing the Kyouk-khyet Khyoung we leave the Nyin-gyan district and enter that of Yé-mé-then, and now we are out of the main valley of the Sittang; indeed, from what I could learn from the natives, it appears that the Sittang River or Poung-loung Khyoung as it is here called, has no open valley above this latitude, but is merely a mountain stream running between high ranges of hills.

The road from Nyin-gyan Myo continues on as before in a northerly direction, passing over or skirting along the eastern boundary of the Endain ground, now and again descending on to the flat alluvial soil. The hills to the east appear much closer, and I was told that the first range at least was on the west side of the Sittang or Poung-loung. The Pegu Yeoma to our west are almost lost in the distance. On reaching Shway Myo, the Tsenthey or Shway-Myo stream is within half a mile to the right, and a few miles in front, where it is running from the west over a broad sandy bed, it is easily forded.

The country to the north being more fertile is more populous and the villages are larger; we pass through Tay-gong, Tâ-kong, Men-yuay, Oun-gyee-gong and many others, bearing to the west of north on through Neoung-gnâ-ben and Neoung-hloot, both large villages, to Ouk-douk: most of this ground is under cultivation; the country about the latter villages, gently undulating arenaceous ground with open bushy jungle and short dry grass, is cultivated only in patches, but more especially on the lower argillaceous soil bordering the sandy ground and in the vicinity of the water-courses between the undulations.

From Ouk-douk the road passes over a plain scattered with trees and bushes; this plain extends up to the town of Yé-mé-then, and is almost wholly cultivated with rice, except to the eastward, where it is marshy, and nothing but sedge grows. This low swampy part is bunded across near the town, forming a tank or "jheel" of 3 miles in length; the bund, its greatest breadth, is more than a mile long.

The town of Yé-mé-then or rather "Yé-mé-zin" (as the Tsikee of the district writes it) is enclosed within a stockade surrounded by a neglected mote, there is one very broad main street running through from the north to the south gate, nearly a mile in length. The great plain around Yé-mé-then is about 10 or 12 miles across, and widening towards the north extends up to Mandalay, or at least to the valley of the Myid-Ngé. The site of Yé-mé-then appears to be the anticlinal or highest part of the low level alluvial ground, for, in the rainy season, when the water of the jheel drained from the hills overflows, it runs off on either side, north and south, by the Sammong and the Guawine streams respectively, the former into the *Panloung* and to the Myid-Ngé, and thence to the Irawaddee; and the latter into the Tsen-they, which joins the *Poung-loung* or Sittang River.

The source of the Poung-loung and that of the Pan-loung are said to be near each other, separated only by a water shed called the Tsin-doung a prominent hill in a direction to the north of east from Yé-mé-then.

Seen from Yé-mé-then, the Pegu range is but just visible above the ungle of the plain, and apparently a slight ridge of no great height, but it is a good way off, some 20 miles or so. The hills on the east are nearer, and we can now distinguish several ranges, between some of them the Sittang or Poung-loung is said to run. The nearest range, distant 5 or 6 miles, diminishes in height towards the north, where it ultimately terminates, to the south it is broken about the latitude of Nyin-gyan, where the Tsenthy joins the Poung-loung.

It may here be remarked that whereas at Rangoon the Aneroid Barometers stood at 29·940 at the level of the river, Thermometer 80,° at Toungoo they had fallen to 29·763, Thermometer 76°, and in proceeding north they gradually fell, till at Yé-mé-then, the average of several days' readings shows a fall of more than six-tenths of an inch since leaving Rangoon, thus indicating an elevation of about 550 feet. The two aneroids here however, do not read the same, though their difference is very constant during the fluctuations. The average of the one C. is 29·33, and of the other D. 29·27. The highest reading was on the morning of the 26th December at 9 A. M. D. 29·35, Therm. 66·°7 and the lowest on 27th December at 9-25 P. M. D. 29·22, Therm. 67·°

·13 difference.

26th December at 9 A. M. C. 29·41
27th December at 9-25 P. M. C. 29·28

·13 difference.*

The elevation of Yé-mé-then, estimated from observations of the boiling point Thermometer, is about 350 feet,† but I think 400 nearer the truth; this would give a proportion of not quite 2 feet rise per mile (Yé-mé-then being about 250 miles from the mouth of the Sittang). As might be presumed, it is a higher rate than in the valley of the Irawaddee (where the inclination is estimated at one foot per mile), otherwise the drainage north of Yé-mé-then could never reach the Irawaddee in the way it does.

There are three roads from Yé-mé-then into the Shan States, one bearing due east, another to the north-east, and a third, by which we went, between the other two; this road is the most frequented, being con-

* As an instance of what little dependence can be placed on any absolute reading of the Barometer in estimating heights, there was a difference of ·085 in a space of 12 hours on the 26th December after the corrections for atmospheric tide and temperature had been applied; this difference is equivalent to 75 feet.

The boiling point Thermometer also showed a difference equivalent to 88 feet between the readings at two operations on different days.

There being no register kept in the province of any standard barometer, I can only give the heights approximately, and in many cases it will be sufficiently intelligible to state merely the aneroid readings to show the difference of elevation.

† Towards the end of this report, it will be seen that the elevation of this plain in the north at Hline Dok is estimated at 550 feet, but the change of season will, doubtless, explain this paradoxy.

sidered the best; it bears nearly N. E. for the first three marches, and then winds about to eastward for the next four marches.

A better idea I think of the road over the hills will be gained if I copy briefly my notes on these seven marches.

First march.—About six miles from the town of Yé-mé-then, having crossed the great rice plain, the road passed on the north side of a prominent little hill of an isolated mass of granite, a short distance from the range to the east; the rock varies from felspathic, often with large crystals, but little mica, to schistose and even into gneiss, huge detached masses are lying about on the slopes. This little hill named Shway-myin-din is surmounted by a number of pagodas and masonry; from the top there is a fine bird's-eye view of the immense expanse of low country sweeping round from the north to west and south, and bounded only by the distant horizon. The Pegu range, consisting apparently of three ridges, gradually subsides; the northermost extremity of the first at a point 5° N of W; that of the second at about W. N. W., and the third is obscured beyond the second, a faint outline of low hills can be traced in the north-west, and an isolated hill, probably Paop-pa-toung, more to the westward.

From Shway-myin-din the road rises gradually towards the Tsakahn at the base of the first range, passing over detrital ground, angular rock of various hard kinds, also gravels and sands, swept down from the hills.

Second march.—Starting from the Tsakahn, direction N. E., over irregular broken ground, the ascent soon becomes steep and rocky. The rocks seen in situ are chiefly altered sedimentary beds, some vertical with a strike N. 10° E. and S. 10° W., also much disturbed, crushed, and irregular, others are schistose, with largely crystallized mica, others are siliceous. After nearly an hour's hard clambering, we arrive upon a tolerably level spot of ground, with a good soil cultivated in part. Here the Aneroid reads 27·36 (Thermometer 60°). Continuing on, a gentle descent along the side of a hill,—we have already crossed one water shed, for the stream on this side runs into the Poung-loung,—the road goes winding among hills making a gradual descent into a vale of some breadth laid out in small paddy fields and gardens, here and there are two or three small villages or collections of houses, a pagoda and a kyoung; this, a good halting place, is called Nong-cway. This valley runs from north to south and is enclosed by a steep hill on the west side, but undulating ground with grass and bush jungle on the east; here I first noticed the common "brake fern" growing luxuriantly. This is at an elevation of 2,000 feet above the sea level, estimated with the Boiling-point Thermometer, and 2120 according to the Aneroid calculations.

Third march.—Leaving Nong-cway, the road ascends over undulating hilly ground, and along the south side of a very steep hill descends into a vale, crosses a small stream of water, and ascends again steeply, then more gradually, along the top of a ridge. The rocks are light coloured, soft sandstones, also bright red and variegated marly beds, broken and

much disturbed. Continuing east along the north side of a hill, the rocks become more argillaceous, and some are traversed by veins of white quartz. We ascend a spur to N. E. and N. with deep vales on either side; occasional glimpses only through the thick jungle are obtained of the ranges of hills and high points to the eastward. Descending and ascending along the top of a ridge we reach a high point, and I take a bearing on a prominent peak to N. W: leaving this high point we descend considerably, and then ascend again to another and higher point where the Aneroid reads 26·599 (Therm. 71°), showing an elevation of more than 3,000 feet. From this we descend again rapidly eastward; having gone down a considerable depth, we pass along a level bit to another hill that we ascend and get on to a ridge going along still ascending for a considerable distance, then rounding a big hill (Aneroid 26·39, Therm. 70°) descend again steeply to where the Aneroid Barom. reads 26·68, now begin to ascend again first gradually, then mounting a very steep bit we reach the camping place "Neoung-kee-douk-Tsakahn." This march was about 8 or 9 miles, but I should say not more than 4 or 5, as the crow flies. Though we started from Nang-cway at 7 A. M., we did not reach this Tsakahn till past 12 o'clock. The elevation according to the B. P. Therm. is 2,860 feet above sea level, and according to Aneroids 2,960 feet.

Fourth march.—Leaving Neoung-kee-douk-Tsakahn, we ascend in a south-east direction the steep side of a big hill, and turning E. N. E. go along the north side of a very high point (Barometer 26·12, Thermometer, 65°,=3,450 feet.) The rocks are the same as before, softish red marls, varying more or less argillaceous or sandy, no hard rock was seen. From this point the road begins to descend along the top of a sharp ridge or spur, from which a good view of the hills in front is obtained, the valley of the Poung-loung lies below with dense fog resting at the bottom, giving it the appearance of a winding lake with many little hilly islands. Descending from the high hill we reach a short level bit and then descend again on the south-west side of a hill on to a connecting part, then along the north side of another hill, descending to another connecting bit, and again ascend another hill, go along the north side of high part, and then descend first gradually along a spur to north, and then a steep and continuous descent to east of north, east, and south of east, the latter part very abrupt and rocky; (beds argillaceous, red marls, nearly vertical, dipping to E. 20° N.) Having got down to where two small hill streams meet, the Aneroid Barometer reads 27·92 (Thermometer, 73°), thus indicating a descent of 1,700 feet within the last mile or so. We follow down this pretty little stream of sparkling clear water, its banks lined with almost every kind of fern, (many I recognized as English); winding in an easterly and south-east direction through a thickly-wooded vale for about two miles, where it turns more to the south and shortly joins the Poung-loung. The road goes on easterly over a small hill of red clay with cherty hard beds and soon descends into the valley of a big stream about 25 or 30 feet wide running from the

north-northwest; this is the Poung-loung or Sittang. The Tsakahn is a short way up on the right bank, a small level spot of ground with high hills on either side.

The march was about 7 miles; but in a direct line I presume the distance is not more than four.

This Tsakahn is at an elevation of at least 15 hundred feet above the level of the sea, and fully one thousand feet above the plain of Yé-mé-then.

Fifth march.—The Poung-loung stream, though fordable by cattle, may be crossed by a very ricketty tumble-down bridge of bamboo. The road directly from the left bank ascends up a steep hill eastward, and it is a hard climb of 15 minutes to reach the top; we continue to ascend in a direction nearly S. E. along a ridge with deep valleys on either side, to the left across the valley is a high jagged range running nearly parallel to the one we are on; having passed the highest part we descend the side to eastward, and go along a spur or branch of the first range we ascended, it apparently connects with the other high jagged one. Now we ascend along east side of hill or spur and reach a narrow connecting part where we can hear the Poung-loung stream noisily rushing down in the valley below. We ascend a hill to east and continue ascending steeply to E. N. E. along its brow going towards the high rocky range, the stream is still heard in the valley below, but without crossing it we enter a sort of gorge or pass and proceed up a dry water course to S. S. E., here there is much limestone about, none was seen in situ, the ground is red clay with gravel, but continuing on in a straight line *down* a dry water course, we pass rugged masses of limestone, towering up on either side, and the soil here is a rich black loam. Just beyond in the hollow of this gully is a hole, into which the water during the rains must drain and join some under-ground stream. It is impossible to trace the system, if there be any, of these hilly regions, while marching across hastily an extensive view is so rarely obtained. The road goes S. S. W. for a short distance between high hills as before, but now more open, then it turns S. E., continuing on a level, then ascends gradually E. 15° N. the side of a gully; the hills here are wholly of limestone, very cherty in part, and covered with rich dark coloured soil: following up a rocky watercourse we shortly descend again, still bearing east in this vale or gully (where the rushing of water is heard below), and soon came out on to an open grassy sward with huge wall-like hills of limestone on either of the three irregular sides, the summits of the hills crowned with rugged cliffs and bluffs, grandly picturesque. We have now arrived at the Tsin-doung-kee Tsakahn ("Foot-of-the-Elephant-hill"), the great axis of the range, and here is the source of the Poung-loung or Sittang River. It takes its rise in this hollow or valley, and is continued by an under-ground passage through the hill we have crossed.

Elevation by Aneroid (c), 2,785 feet, Aneroid (d), 2,415 feet, above sea level.

Sixth march.—This march was spent in clambering up the big hill in a steep and zigzag fashion; the ground is very rocky, masses and pebbles of limestone well-rounded and water-worn in holes and cavities. The road crosses over the lower and more southern part of the Tsindoung-gyee and then continues on easterly along a spur or ridge, a short way to the Tsindoung-kite or tate Tsakahn ("Halting-place adjacent to, or upon the Elephant-hill.") But before arriving at the Tsakahn, I made for the top of the hill ascending by a spur, and then continued along the main ridge till I reached one of the highest rocky peaks composed of a rugged mass of loose fragments of weathered limestone; all along the crest of the hill there is but a scanty sprinkling of soil, and the rough blocks and lumps projecting above the long grass give the appearance of vertical rock, though no bedding was discernible. At noon on the summit of this rocky heap, (with a cold cutting wind blowing up the north-east side) the Thermometers stood at (*n.*) 51°·7, (*c.*) 52°, and (*d.*) (spirit) 47°·7; Barometer (D.) 24·600 and water boils at about 203°·5, thus indicating an elevation by the one (Bc. Pt.) of 4,780 feet, and by the other (Barometer) of 4,900 feet above the sea level, and an ascent from the foot of the hill of 2,350 feet, and 3,070 feet above the Poung-loung Tsakahn. This peak is in latitude 20° 30′ 50″ North.

The Tsin-doung-gyee range is the natural boundary between Burmah Proper and the Shan States. Viewing the hill scenery, which is very grand, from this elevated point, it is difficult to make out any system or determine the main water sheds, the appearance is that of a sea of irregular and broken hills, (their strike is about north and south, or rather N. N. W. and S. S. E.) Lay-byin-toung, a very lofty hill, is visible a long way off to the north north-west, and Myin-ma-te-toung, a prominent rocky bluff, distant nine or ten miles to the north-east. There is a large and conspicuous pagoda called Shway-myin-bone, (said to be equal in size to the Shway-dagōn), built on the summit of a hill in the great valley that sweeps down to the north.*

Seventh march.—Although this camping ground, "Tsin-doung-tate Tsakahn," is literally within the Shan States, there remains yet one more hilly march before we are fairly into the country. On the morning of this day's march (6th January), I observed for the first time a white frost on the damp exposed parts. A piercingly cold wind was blowing from the north-east, yet the Thermometer suspended outside the tent showed a temperature at 5-15 A. M. of Therm. (*n.*) 44°·5 (*f.*) 40°·5.

Leaving this camping ground, the road bearing first to the south of east and then east, winds round to the big hill called Thabea-doung,

* During the last two marches I collected from about the limestone a large number of shells; these, together with the whole of my collections, both land and freshwater shells from the Shan country, I have handed to my colleague, Mr. Theobald, who kindly offered to examine them; they comprise many new species and varieties, but they are more interesting in considering the general distribution of shells. Mr Theobald has written a paper on the subject, which will shortly appear in the Journals of the Asiatic Society.

observed yesterday from the summit of Tsin-doung as intercepting the view to the east; it appears to be almost, if not quite, as high as the latter, for at 7 o'clock the Aneroid reads (D.) 24·60, Thermometer 41°. We have already left the limestone rocks, and are now on a series of argillaceous and sandy beds, comprising a fine-grained incoherent sandstone of a light yellow color also reddish and earthy; some harder beds appear nearly vertical, striking N. 15° E. and S. 15° W, others again argillaceous and chalky, with layers of pipe clay, called by Burmans "mea-thin-gé;" these beds are also vertical, their strike runs N. 30° W. and S. 30° E.

From this hill a better view is obtained of the great expanse of country now before us, a panorama of cultivated land and open downs, with hill and dale in repeated succession, the higher ranges forming the great water sheds between the main valleys; these appear to run very regularly north and south. On a clear day, the great Neoungyuay lake is said to be partially visible from this hill, distant some twenty-five or thirty miles in a south-east direction. Leaving this hill, the road makes a continuous and winding descent, over broken stony ground on to more gentle slopes and open undulating downs, covered with short grass and bushy fir trees; the road still descending, but gradually, in a north-east direction until it reaches the camping ground in the valley near a village called Toun-hla. This is in latitude 20° 32' 30", and at an elevation of more than three thousand five hundred feet.

There are several small villages scattered above and below in this valley, and here we at once notice an appearance of more industry in agriculture than is generally seen in Burmah. The land is systematically drained and irrigated, for there is but a small supply of water, and that is husbanded and applied in a most economical manner. For example, the rich earthy slopes on either side of any little stream or trickling, are levelled after the manner of a broad irregular flight of steps, and the edges bunded so that the water, when required, is let on from above and caused to meander from one step or little enclosure to another, till it finally reaches the lowest, where it is generally collected, by a bund across the vale, into a tank, and the surplus water overflowing through bamboo spouts constitutes the public lavatory. This capital bathing arrangement may be found at almost every village and town where there is a stream adaptable for the purpose.

The small stream or rivulet in this Toung-hla Valley is here flowing to the north, but further down it winds to the right, and bending round runs southward down the main valley into the Neoung-yuay-En. This Toun-hla Valley is enclosed along the east side by a steep scarp and rocky face consisting of beds of a fine grained reddish sandstone of no great hardness, though the bedding is well preserved; the dip is E. 15° N. < 35°; overlying these is a thick bed of calcareous breccia,* the fragments contained being often large. There was said to be much limestone also out

* This limestone breccia occurs again at Payin-doung hill, in the north north-east. Myin-ma-te-toung is also composed of a similar calcareous rock.

to the eastward. At the base of this scarp, near the village, there is a calcareous, or so-called "petrifying" spring, and the ground round about it consists of calcareous tufa deposited from the water; this tufa is worked and much used in the building of pagodas, &c.

The Toun-hla District does not extend eastward; beyond the little ridge is the Pan-loon Vale, and then beyond a highish ridge of hill is said to be the La-mine District, then east of that the Pay-mee and Baw-nen, and then the Neoung-yuay.

The high road to Thai-nee lies through Kyouktat, a large town, three short marches to the north north-east, but in a straight line, as on the map, 21 miles only from Toun-hla. Proceeding down the valley for about a mile and a half, the road turns up the east side at Sha-ben-yua, and continues on over irregular ground towards the foot of a very prominent hill with high rocky bluffs called Myin-ma-te-toung; skirting along on the eastern side, we reach the village of the same name, then passing over cultivated land and open downs, we again meet the Toun-hla stream, now running from the north-west; it is crossed by a good timber bridge; there is some rock on its left bank, the same foraminiferous limestone as that of Tsin-doung. We now pass over a broad stretch of tolerably level country, grassy downs with fernbrakes and a few bushes, intercepted by the flat alluvial ground lining the banks of the streams. The drainage of two tributary valleys, the one from the north, from Pway-hla, and the other from the north-west (separated above by irregular hills or uplands), here meet, and joining the Toun-hla stream, runs down south through the great plain of the main valley. There are many large villages here about, as Na-ōn, Oum-bân, Thamma-kân, and others; the landscape around is nowhere to be found in Pegu or Burmah, and reminds one strikingly of the downs of England or the farm land of Devon; the soil is light, very rich, and of considerable depth, of a red and dark chocolate colour, and with the exception of the more recent clay of the plains, is the same all over the States. The greater portion of this land is under cultivation, the labourers turn up the soil with long handled tools, and then burn it in heaps, and manure it.

A great valley of low country lies to the east. These parts may be called the "Up-lands" or "Downs" of the Shan States. From the appearance of this ground, and the general configuration of the country, I conclude that this rich soil is a lacustrine deposit; whereas that of the plains and the flat stream banks is a deposit of more recent date, probably fluvial.

After passing Thamma-kân, the high road continuing in a north north-east direction ascends over higher land, from which, looking across the champaign country in the great valley on the right, the high ranges of hills are more discernible: the Moné District lies somewhere to the east of them: and turning to the west the great barrier of the Shan States looks as impracticable as ever.

The high road from Tin-gyay-gyat passes through an avenue of trees, and is hedged in on either side for some distance.

The plain of the great valley on the right appears to terminate about this latitude, the valley being continued on northerly in gentle undulations, and secondaries or tributary vales obscured from view by their jungle.

Kyouktat is a large town or rather overgrown village, and one of the most populous in the States. Here there are some smelting works of argentiferous galena that occurs in the limestones and calcareous deposits of this district, but it was impossible to ascertain from the natives the precise localities where it was got. The ore* is purchased by the smelter at the rate of two to three-and-a-half tickels of silver ("baw") per basket measure (about a bushel) of ore, uncleaned, often containing a good deal of rubbish apparently; it must be rich however in silver, or this metal could not be extracted by the simple and rude method practised.

The larger lumps being broken up, the ore is first put into a small cupola or blast-furnace, together with charcoal and a proportion of broken slag. These cupolas are of clay and built upon the ground two and a half or three feet in height, and 14 to 16 inches in diameter; women are employed standing on raised platforms to pump the blast, generally two to each furnace; as the sulphur is driven off, the reduced metal accumulates at the bottom of the furnace, and is ladled or rather scraped out from below, (the scoriæ being removed,) into moulds in the ground, where it assumes the form of massive lenticular ingots; when cool and set these ingots are removed to the refining shed, and placed into small reverberatory furnaces, with the fuel, large pieces of charcoal supported on fire-clay-bars above the metal, which is thus kept in a fused state for about 24 hours; during this time, as the lead becomes oxidized, it is removed by gently revolving over the surface an iron rod around which the lead in the form of litharge solidifies, and as this process is continued, it accumulates in a number of coatings or layers one upon the other. When all the lead has been thus removed, the silver residue is taken out as a button or plate on an iron ladle. The rollers of litharge have of course to be again reduced, in order to convert them in metallic lead, and there must be a considerable loss of the metal during this as well as the former process.

The plate of silver obtained is considered pure, and is not used in this state as currency, but is sold to the silversmiths and jewellers, who alloy it with copper and lead, in various proportions.

The smelter at Kyouktat also buys up the argentiferous and cupiferous lead residue from the silversmiths' forges, and extracts the several metals in his furnaces.

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*Specimens of this ore accompany the Report.

This lead ore occurs not only in the Kyouktat, but also in the districts of Pendayah and Bawzain in the north-west and north.

The scenery in these parts, especially in the Pen-dayah valley, is about the most picturesque in the Shan States; cultivated fields, open downs, and hillocks spersed with bushes, the many villages with their Kyoungs encircled with jungle clumps, white and gilded pagodas clustered in the vales or tapering upon the summit of every prominent point on the western hills that rise towards the north into a rugged mountain range, the azure mist of the valleys intervening, the whole makes up a very pleasing landscape.

Leaving Té-thone, a large village about 9 miles to the north from Kyouktat, we went rather a round-about way to reach Mine-byin Myo; instead of bearing east-north-east, we continued another march to the north, keeping up on the high land that forms the water-shed between the drainage of the Neoung-yuay lake and that of the Myid-Ngé; we pass over a good deal of irregular and rocky ground, the out crops of semi-crystalline limestone and other beds projecting through the scant soil, have waterworn and smooth surfaces; they are dipping to S 30°-40° E., < 35°-40°: there is little cultivation about here, and the hills are covered with jungle. I could see but little of the conformation of the country till descending on the second march from Té-thone. The first part of this second day's march, a very long one, some 18 miles, was a general descent over waste land covered with jungle, then continuing on in an easterly direction, we pass through the low country and on to the plain of the great Mine-byin valley; the soil of this plain is a stiff alluvial clay of a peculiar lead-grey or slate color. When within a mile of the town, we cross the Nat-ee Khyoung by a substantial timber bridge; this rivulet is the largest yet seen in the Shan country, for in the districts hitherto passed through, there was a comparative scarcity of water, and must be very much so in the latter part of the dry season; the Nat-ee is said to take its rise from a large jheel or swampy lake up the valley to the south; there is a considerable body of water of a bluish color, but beautifully clear, flowing between steep banks and over a rocky bed with many noisy falls and rapids, it runs to the north, and joins some other stream that flows into the Myid-Ngé. There are also several fine tanks of water in the neighbourhood of the town, which is situated on the low country bordering the east side of the alluvial plain. Mine-byin Myo is in Latitude (estimated) 21° 5′ N. Longitude (assumed) about 96°45′ E., and is at an elevation of 2,045 feet by the boiling-point, and 2,400 by the Aneroids. This is about fourteen hundred feet lower than the Toun-hla Valley.

From Mine-byin the most direct road to Thai-nee Myo would be to continue down this valley northward to Youk-zouk, thence to Thong-zé, and on to Thei-nee. But we directed our course to the town of Lé-deah, which lies to the east-north-east, taking five marches to reach there. In the second march from Mine-byin, we cross a high water-shed and descend

among a number of little vales and streams that run into the valley of the Nam-pon. This large stream flows down towards Moné and ultimately joins the Salween River.

The rocky ridge of hill just crossed is more than 1,200 feet above the Mine-byin Valley, it forms the boundary between that and the Moné district.

All these little vales down on the east side are laid out in miniature paddy fields, irrigated in the manner previously described; the soil here is very rich, and the hilly downs and uncultivated parts are covered with short grass and the brake fern, also few bushes or trees; the higher hills are wooded with firs and other ever-greens.

There are many villages about, the two largest seen being Pen-zin and Nattit. These places are about 3,300 feet above the level of the sea, or 900 feet above the Mine-byin Valley. Now I must endeavour to describe the hilly mass that has to be crossed in going from Nattit to Lé-deah. The hills tower up range upon range to a height of some 5,000 feet above the sea level, 2,500 feet above the Mine-byin Valley on the one side, and 2,070 feet above the valley of Lé-deah on the other; these figures show the difference of levels, nearly 500 feet, between the two valleys. The ranges strike about north and south; and towards the north the main ridge, constituting the great water-shed or boundary between the drainage of the Myĭd-Ngé and that of the Salween, continues on in an unbroken line for some 70 or 80 miles, where in latitude 22°20′ it is interrupted by a valley of low country.

The rocks of these hills are for the most part shaly, of a reddish yellow color, also mottled pink and white, and purple arenaceous shales and clay-stones, varying to cherty; white quartz also occurs in these beds. On the eastern side, beds of sandstones predominate, parts of which are very micaceous, passing into mica-schist with wavy foliations, and in the highest hill to the east of Nattit I observed a gneissic rock of disintegrating felspar and quartz.

From Nattit there are two roads to Lé-deah, the one to the north called the "monsoon road," ("modwin lán",) ascends the side and winds along the top of the great water-shed till, arriving at the latitude of Lé-deah, it makes a very precipitous and long descent to the bank of the Nam-pōn at Neoum-ben-yua, then, without crossing, the road bends round northward, and turning to east passes over three minor ridges of hill into the Lé-deah Valley.

The direct road bears E. N. E. from Nattit, passing over a series of hills by more gentle ascents and descents, though much intercepted by streams that render this road impracticable during the rainy season. The Pōn-Khyoung is crossed and re-crossed several times; at Nam-shain village, one march from Lé-deah Myo, it runs through a broad and fertile valley to the north, where it is joined by another stream and vale from the north-north-west, then bending round to westward, its valley

becomes irregular, and again to the south very contracted; from Neoung-ben and Bambway-gong to Nattit, this stream runs through narrow gorges between lofty hills, occasionally opening out into little circular patches of paddy fields. Its course throughout presents the idea of there having been formerly a number of hill bound lakes, running into each other: this most probably was the case not only in that of the Nam-pōn, but in very many, if not all, of the stream courses throughout the Shan States. Immense freshwater lakes separated by the more lofty ranges of the hills; (—the Neoung-yuay lake for example, or the lakes of Scotland,—) as the land was gradually elevated, the lakes divided up into many smaller, connected only by their streams and rivers, which in the course of time drained the lakes by deepening their own channels, and cutting their way through the rocks. The valley at Mine-kine, in the north, is a good illustration; looking down from any of the surrounding heights one cannot be otherwise persuaded but that it was formerly a great lake, for it is enclosed among hills, and its stream has to find its way out on the north side, passing through deep and rocky gorges, or passes, until it reaches the open country of the Lé-deah valley where, turning southward, it runs down on the east side of the town and continues its course towards the Salween.

Lé-deah Myo, like many other of the large towns in the Shan States, was formerly of much greater importance; owing to local disturbances, quarrels among the native chiefs, and other causes, this once flourishing town now comprises barely two hundred houses: the high street or main road through the town is very broad and nearly half a mile long; it runs east and west, with cross-roads at either end; the houses are small and low, as all Shan houses generally are, with little gardens and irregular enclosures around them. The town itself is enclosed by an embankment on the north side, and a moat on the south; a stream runs along the west side, and a large tank bounds the east.

Lé-deah town is in latitude (estimated) 21°16′19″, and longitude (assumed about) 97°30′. Elevation (by boiling point) 2,640 feet, (by Aneroids) 2,895 feet.

The small stream along the west side of the town runs up north for a short distance and then joins the main stream of the valley, the "Nam-tain" or "Thein Khyoung," a very broad and swift flowing rivulet, that takes its rise among the high hills south-west of Mine-kine, called Lōi-tain-pa and Tsindoung, (the people inhabiting these hills are of the Pa-loung tribe; they cultivate the poppy and manufacture opium). The Nam-tain after getting out of the Mine-kine valley, as before stated, runs south draining the great Lé-deah valley towards the Salween River.

From Lé-deah the Salween is about 70 miles in a straight line due east. There is a good road down to the Tâ-caw ferry; it passes over a great common and gently undulating open downs, and when at 16 miles from the town (Lé-deah), the road passes up a sloping scarp that runs north and south on to another great spread of undulating country devoid

of jungle. Fifteen miles further on, the road ascends another scarp, and about four or five miles further, again rises and winds among cliffs and rocky isolated bluffs of limestone; having passed this somewhat hilly ground, the road begins to descend, and when at rather more than forty miles from Lé-deah, the descent becomes much steeper, the latter part through thick jungle, till the narrow valley of the Nam-pan is reached; the bed of this valley is nearly thirteen hundred feet* lower than Lé-deah, and rather more than 700 feet† above the level of the Salween water at Tâ-caw.

The Readings of the Aneroids were as follows:—

Lé-deah	(C.) 26·620	(D.) 26·667	Thermometer	46°	5 o'clock	A. M.
Simone (E. of Lé-deah)	„ 27·128	„ 27·07	„	65°	5 „	A. M.
Nam-pan (E. of Simone)	„ 28·182	„ 27·995	„	64°	5 „	A. M.
Top of range (E. of Nam-pan)	„ 26·872	„ 26.847	„	80°	10-40 „	A. M.
Tâ-caw ferry (Salween)	„ 29·118	„ 28·836	„	59°	5-45 „	A. M.

This Nam-pan or "Ben-Khyoung," as it is called by Burmans, is the largest of any we saw in the Shan States, where met in the north it is a deep stream and must be quite a river during the rains, running over a pebbly and sandy bottom, but here at Kong-häi it is spread out as a shallow lake, nearly half a mile broad in places, with low banks and islands covered with trees and jungle; its water, though beautifully clear and of uniform depth throughout, has a peculiar blue color arising probably from the large amount of salts of lime contained in solution; indeed the whole surface of its bed is of "travartin," a calcareous deposit. The current here is scarcely perceptible, but where the water flows in there are broad interrupted falls of several feet on either side of a small island; and the scenery here is extremely pretty. I was informed that the river retains the same lake-like appearance for a long way to the south, interrupted only by falls here and there, and that it joins the Salween near the town of Mo-né.

From Kong-häi village on the east side of the Nam-pan there are yet two marches before reaching Tâ-caw, the first march and half the second is spent in mounting up by a series of slopes and steep ascending scarps to a height of twelve hundred feet: near the top, the road avoids one rugged ridge by rounding its northern extremity, and then continues on to the brow of the mountain, from which it descends very steeply to the Salween River bank, a depth of nearly two thousand feet.‡ This range of hills is covered with dense forest jungle on the east side, but the more level parts and the slopes on the west have been cleared, and are mostly under cultivation; we passed through a large orange garden on these hills.

But to return to Lé-deah, for there are yet some hundreds of miles to review before arriving at the spot where we first struck the Salween.

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* Mean of calculations, 1,287 feet.
† Mean of calculations, 748 feet.
‡ Mean of calculations 1,963 feet.

Proceeding rather east of north from Lé-deah, we pass over a very high water-shed, into the Mine-kine valley, follow down in the valley for some distance, and then ascend to northward on to high regions again: in the valley and on the ascent, very many streams of water were crossed, but among these truncated hill tops, much of the drainage is into hollows and holes, and thence is continued under ground.

These elevated parts are clad with long grass, fern-brakes, and in part woods of fir and other trees. To the westward three steep and lofty ranges are visible, running apparently N. N. W. and S. S. E.

At Ban-sam (or Bân-zâm), we have descended to a level rather below that of the Mine-kine valley, but still above Lé-deah: here we meet a broad and noisy brook, rushing impetuously along its rocky bed. At the first sight of this stream, I thought I recognized an old friend from Mine-kine, but our learned guide and others assured us that we had not seen it before; this being the case, I have little idea as to where this body of water has its source. This brook, called Nalloung, is here joined by the Këa-hoim Stream; it runs to north-east passing by Bân-woot, and then bending round to the south-east joins the great Ben Khyoung.

But before reaching Bân-sâm, we have passed a hot spring about seven or eight miles from the town, and near the village of Bâm-pōn; this spring rises at the side of a mountain stream; the water is very clear, and as it issues at a temperature of 104° Fht., has a different specific gravity from that of the cold stream, into which it flows (mixing like spirits with water). Where gas is issuing from below, the thermometer goes up to 128° and 130°, leading me to suppose that these bubbles are of steam.

In the same stream, not far from this spot, the natives occasionally wash for gold, near the village of Këa-hoim. The rocks in the neighbourhood are shaly sandstones, also fine grained sitly beds, crushed and somewhat shistose, they are dipping to the south-east at high angles.

Again, within a mile of the town of Ban-sam, there are several springs of hot water, rising in the low ground west of the Nalloung Khyoung. The two largest are close on the side of the brook, and about a hundred yards apart; there is a very considerable discharge of water issuing at a temperature of 82° and 83° respectively, from limestone rock largely crystalline, and encrused over the surface with a calcareous deposit from the water. The temperature of the brook, above the influence of these two springs, was at 7 A. M. 66°.5, whereas the temperature of the air was only 51°. This tepidity arises partly from the influence of a pleasantly warm stream that flows into the brook a short way above on the east side; indeed, most of the streams throughout this district are tepid more or less; they are strongly calcareous, and deposit lime in the form of "tuff" or "travartin"; extensive beds of this travartin occur all over the country, especially in the vicinity of the limestone; in several places it is worked in open quarries and used for building purposes.

After leaving Ban-sân the country passed through is less hilly than hitherto. To Bân-woot by the direct road is one day's journey, but,

(for certain reasons I need not here narrate,) we took one march to the east, passing over bushy and ferny downs, and cleared grassy slopes and gentle undulations covered with a rich light red soil much cultivated, and divided into broad valleys by a low range of hillocks, and the remnants, as it were, of a rocky limestone ridge, left in little bluffs and peaks of crystalline limestone ; these low anticlinals strike about north and south. Having arrived at Hentone bazaar, our fust halting place from Bân-sâm, we strike across country to Kain-loon in the north-east passing over low ground and a general common *. There are no high hills seen about here either to the east or west ; north of Kain-loon there is a hill, but of no great height, over which we pass on to open country again, and, descending gradually, shortly come to the small town of Ban-woot : we are now in the Thainee district, and bending our course to Lâ-sheoo.

Crossing the Nalloung Khyoung (here about 80 feet broad, and may justly be termed a small river, as it is scarcely fordable by loaded bullocks), we ascend over downs and commons, similar to those previously mentioned, for about twelve miles more, when we descend on to lower and a more level spread of open champaign country through which the Nam-â-lâ Khyoung flows from the north-west to south-east ; here it is joined by many small streams from the westward, and also from the hilly mass on the north side of this stream ; we then proceed up the valley, and rounding the big hill, called " Lôi-Sim-oo," arrive at the large village of Mine-zaik, situated in a small vale from the north, not more than a mile across, and bounded on either side by low hills steeply scarped towards the valley. Far off to the westward many long ranges are visible, and I was told that Thee-baw lies to the west-south-west, distant about 20 or 30 miles.

Proceeding from Mine-zaik in a northerly direction, we ascend over higher ground beyond the valley, and having gone about three miles we arrive at the brow, beyond which is a considerable depression almost a precipice ; from here we see in front great wooded valleys, (country of a much lower level than what we have passed,) and beyond again high ranges stretching out east and west across the landscape, and shutting out all view of the country further to the north. The whole of the land now before us drains into the Myid-Ngé.

Following down the steep descent on to more level ground, we pass the villages of Nan-goo-san and Pâ-sheng, and then descend again through thick jungle along the west side of a deep vale with a noisy stream below, that runs northward ; and again pass over undulating country covered with jungle ; there is also a great valley on the left off to westward, and a high range of hills beyond, distant about six or eight miles.

* Along the stream courses and hollows of this ground rough weathered masses of the same crystalline limestone are exposed and partially enveloped in the soil, giving the idea that one is passing over the old bottom of a great lake or estuary,

The road still descends often steeply till, on arriving at the Nam-ma, it is intercepted by a deep and rocky chasm along which the water rushes impetuously; this is an interesting spot, the chasm I imagine has been caused in part by a "fault" or dislocation of the rocks, the one side being rather more elevated than the other. In the south side is a very pretty grotto with stalactites pendent from the roof and encrusting the ledges of rock, that are fringed with delicately tinted ferns (*adiantum*); the deposit of lime is from a calcareous little stream that, percolating through the upper strata, falls in a thousand tricklings from the roof; the water in the deep hollows of the brook below is of sea-green color. This brook, called the Nam-ma, is here running irregularly from east to west; it is said to join the Nam-poung some distance below Ban-zé.

This is the first bridgeable stream we have come to that has not a substantial bridge across; they say there was formerly a good bridge here, now there is but a very ricketty bamboo arrangement supported upon the long trunk of a felled tree.

Having crossed to the north side we ascend and pass over a long rising sweep of country mostly covered with jungle, but towards the north more open and cultivated; having made about seven or eight miles of northing, we come down on to the flat alluvial banks of the Nam-poung near the town of Ban-zé. This stream is quite a rivulet running very swiftly over its pebbly bed between high banks about a hundred feet apart; the broad valley of this stream is at a lower level than any yet visited in the Shan country, being only about 1,660 feet above the level of the sea, and rather more than twelve hundred feet below the Lé-deah valley.

It comes from the east or rather north of east, and, from Ban-zé, goes on in a westerly direction; after receiving the waters of the Nam-ma and another called Nam-poo, it is said to join the Myid Ngé near the town of Thee-baw.

It was reported that gold is washed for in some parts of this Nam-poung, but as usual, on making enquiry on such subjects, the fact is ignored altogether.*

From Ban-zé, Lâ-sheoo is only fourteen miles on the map, but it requires two severe marches to mount, cross, and descend the mass of hills intervening. This high range, covered with dense jungle, lofty forest trees and rank underwood,† especially on the south side, rises to about eighteen hundred feet above the level of Ban-zé;‡ it runs for a long way towards the east-north-east, but to the westward it appears to break up into irregular hills, beyond which are distant ridges running longitudinally.

* I was subsequently informed that gold was much worked at a place called Mine-loon-sop said to be near Ban-zé.

† A single frond of *Nephrodium*, measured eleven feet in length, the frondlets began to branch off at 5 feet 4 inches from root, they spread out a width of 5 feet 8 inches. A very handsome specimen.

‡ Where the road passes, the mean of calculations gives 1,720 feet above Ban-ze.

LOI-SAT and the Southern Range as seen from Mine-Yaw. (vide page 47.)

Of Lâ-sheoo nothing remains but the stockaded residence of the Governor and his troops, and the disfigured sites of deserted villages; it is situated in the broad valley of the Nammayow stream, beyond which is another high range of hills running east and west: the road to Thainee, which town is only about 20 miles distant from Lâ-sheoo, lies across these hills in a north-east direction. That town was also entirely destroyed in the late disturbance.

From Thainee, the nearest point on the Salween is said to lie north of that town; but I was also informed that the Myid-Ngé has its source about sixteen miles to the north-east of Thainee, and that it passes close on the west side of the town; little dependence however can be placed on such reports, for the so-called Myid-Ngé has another name in these latitudes, indeed there are so many large streams that go to form the river, it is doubtful which of them is the main one.

About six miles to the east of Thainee-myo, there is said to be a poisonous spring, and strewn around it are bones of birds and other small animals; I failed in endeavouring to procure any of the water.

The silver-lead mines are said to be three days' journey beyond Thainee.

At Lâ-sheoo there is a large shallow pond of hot water at a temperature of about 119° Fht.; there are a number of springs in it and gas occasionally bubbles up in many parts: one spring, slightly above the present level of the pond into which it flows, shows a temperature of 124° on the Thermometer: this was at 9 o'clock on the morning of the 21st February, temperature of the air about 57° or rather less. The water of this pond flows off on the north side and joins the Mam-may-ow stream. Also at Mine-tin up the valley there is a tepid spring in a large swamp. In the early morning, large volumes of white vapor may be seen rising from these places, the hot pond especially.

The valley of the Nam-may-ow, better known as the Lâ-sheoo valley, is at an elevation of 2,400 feet (nearly) above the sea level, and 750 feet above Ban-zé; being 486 feet* lower than the Le-deah valley.

Our camp was in latitude (estimated) 22° 58′ N. longitude (assumed,) about 97°30′ E. With the vain hope of reaching the Salween River at this high latitude, we proceeded westwards up this valley for three marches; first to Mine-tin, second to Mine-yin, and finally to Mine-yaw; here we were very near the head of the valley and within two or three days' march of the Salween (distant less than 30 miles): but it was deemed advisable to retreat to the protection of the Governor at Lâ-sheoo.

Before leaving Mine-yaw, however, I made an attempt to reach the summit of a very prominent bluff called Loi-sât, about the highest part on the southern range: having ascended to the foot of the crag, and within a few hundred feet of the top, I was prohibited by the people of a large village in the vicinity from proceeding any further, on the plea

* These figures are the means of a number of calculations.

that there was some sacred foot-print above, and that permision must first be obtained from the head man of the town in the valley: this was too much of a joke—to descend seven miles for permission and mount again,—so I contented myself by making my observations at the elevation attained; which proved to be about 15 to 18 hundred feet above Mine-yaw, and over four thousand feet above the level of the sea.* Its latitude (estimated) is 23° 0′ 50″ N., longitude (assumed) about 98°E.

From the summit of the crag, the boundary of the Chinese territory is said to be visible on a clear day. Upon the lesser slopes, where there is rich soil even high up on these hills, the white poppy is grown extensively, and in the glens below are large plantations of the sugar-cane. The tribes who cultivate in these hilly regions are the Pa-loungs chiefly, but also the Kachins and a remarkable people called "Shan-Tayoks" (*a*) from the borders of the China territory.

The scenery around Mine-yaw is beautifully grand; it fails me to attempt a description, and I must therefore content myself by comparing it to views in Switzerland. The valley, contracted below (where the stream, falling over a succession of rapids, wanders through deep ravines), here widens out in fertile downs and slopes three or four miles across, and was, doubtless, a great lake originally. This idea is strengthened when viewing a large cascade on the north side of the valley, where the water of a mountain stream, coming to an abrupt termination of its bed, falls precipitously, a depth of fifty feet, into the valley.

Having returned to Lâ-sheoo, we there determine to try some of the lower roads to the Salween; it being doubtful whether these roads are sufficiently open for elephants, we reduce our kit by sending most of the heavy baggage down to Mandalay by way of Thee-baw and Thong-zé, and then retrace our steps (making long marches for the season is getting late, March 6th) to Mine-zaik, from here we branch off to the left, cross a water-shed, and descend into the Ban-sin valley.

From Ban-sin we take one march to the east, across open country, downs and cultivated land to Mine-yé (as there is some difficulty or uncertainty about this road,) we make two marches to the south, in order to avoid a high and steep ridge of hill that lies to the east running north and south: still journeying through open country we cross several large streams from the north, pass through Bam-pé, a very large and straggling village; a low wooded country lies on the west and irregular hills two or three miles to the eastward; we shortly arrive at the village of Mine-kha. From Mine-kha we strike east, "across country" (in the true sense of

* By Boiling Point, Mine-yaw above sea	2,300 feet	By Aneroid Mine-yaw above sea	2,555 feet.
By Boiling Point, Hill above Mine-yaw	1,845 „	„ „ Hill above Mineyaw	1,490 „
By Boiling Point, Hill above sea level	4,145 „	„ „ „ „ sea level	4,045 „

(*a*) They are very different from the Mussulmans who bring caravans from China.

that term) for two marches to another Mine-kha or Mine-khât; the ground passed over in the first of these marches is very irregular and hilly, till on arriving at the bank of a large stream or rather brook, which is crossed by a most ingenious suspension bridge forty feet span, of bamboo supported mainly from the overgrowing trees. This stream comes down from the N. N. W. along the base of the range that here terminates in a very high hill. On the second march we round the foot of this high hill (in which I observed some masses of trap rock and a purple colored porphyry), and proceeding on, still in an easterly direction, over undulating ground towards another big range, ascend very steeply to the top of a high spur from which is obtained a bird's-eye-view of the hilly country around, but the atmosphere is extremely hazy, arising from the prevalence of jungle fires. *

Crossing this spur, we come to a very abrupt and steep declivity on the east side, and descend diagonally by a good road cut along the side, into a deep gully; this gully serves as a sort of flood-way during the rains; for the stream that comes down from the hills to the north, now but a small one, here enters a cavity in its bed and is continued underground.

Having crossed the gully we ascend on to high downs or uplands; there is a great conical mountain on the left, distant about two or three miles; here and there are a few villages and several small patches of paddy ground; proceeding on eastward we get off these downs, and then descend into a very large ravine about half a mile wide, at the bottom of which is the great Ben Khyoung; this small river, though of no great depth at this season of the year (16th March) and fordable on horseback, must be very deep during the rains; it is here running from north to south; having crosssd we slowly ascend the eastern side of the gorge by a steep winding pathway that leads through a sort of pass on to high downs again; and continuing on we shortly arrive at the second Mine-kha or Mine-khât, in a cultivated vale about half a mile broad, with irregular wooded hills on the east side; this small vale drains to the north-west. Mine-khât is about 16 or 18 miles only from the Salween according to report, but this direct road is also denied us; the "Tummong" or head man of the village, however, promises an "illustrious guide", who will actually "take us to the Salween by another, and (?) better road a *little* further to the south."

We leave Mine-khât, (with our "illustrious guide,") and go south for *sixteen* miles, passing first up through country of tolerably uniform level, but soon get among irregular wooded hills (few fir trees about), with steep scarps and vales; there is a high range on the right, running about north and south: having gone about eight or nine miles from Mine-khât, we begin to descend, here there is a village called Nam-pât, and much cleared ground. At 10 o'clock A. M., the Aneroids read (D.) 26·174, (C.) 26·116, Thermometer 80°.

* Indeed at this season of the year the atmosphere is so thick, the sun quite loses its intensity after 4 o'clock P. M. and may be gazed at with impunity.

The rocks seen about these hills are argillaceous and arenaceous shales and clays, mottled and variously colored, also much limestone projecting in huge vertical masses, mostly water worn, the bedding strikes about north and south.

Remarkably few water-courses were seen during this march, indeed the whole drainage of these parts appears to be into hollows and underground passages.

From Nam-pat there are no hills visible for a long way in front, but the view is misty and indefinite.

Leaving this village, we still bear on southward, make an abrupt and zig-zag descent down on to low country, here the high range on the right terminates, but that on the left is continued on as a precipitous rocky cliff.

No water-course is met until arriving at a large village called Ho-nam, ("stream-head,") where a number of springs of sparklingly clear water flowing together, form a large stream, that continues its course but a few miles in the light of day and then is said to disappear again underground.

At Ho-nam the Aneroids read (at 4 o'clock A. M.) (D.) 26·933, (C) 26·983, Thermometer 54°, thus showing a descent form Nam-pât of about 850 feet.

From Ho-nam we continue in a southerly direction for about four or five miles more, over gently undulating cultivated ground, also some level paddy land; there are hills about, especially on the east, a continuation of the rocky cliff, and a high sugur-loaf hill beyond. Turning eastward, we ascend steeply and go winding along the top of a spur, again descend and ascend a small but deep ravine, where a little stream from the north joins a larger one that flows eastward. Continuing on along the top of a spur or ridge with vales on either side, (the hills appear to run about east and west,) again we go down a very steep descent into a vale, here we cross a broad-bedded stream running from the north-east to westward; and then ascend and go along the top of an irregular spur, (the vale on right drains to westward,) continuing on we round the north side of a big hill and shortly make a final descent to the village of Ho-too, situated in a small paddy vale; its stream, the same as the one crossed a short way back, is here running from the east north-east.

We are now one march from the Salween, but in a straight line due east, I should say the river was not more than three or four miles distant.

Ho-too is in latitude (estimated) 21° 58′ 45″. Its elevation is 2,400* above sea level, and about 1,300 feet † above the level of the Salween.

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* Mean of calculations—by Aneroid (D,) 2,430 feet, by Aneroid (C.) 2,380 feet

† " " " " " " 1.270 " " " 1,430 "

Elevation of river above sea-difference 1.160 " " " 950

Mean 1,055 feet.

Although so near the river we can gain but little information concerning it, and that little is vague and unreliable; for instance, they say as to the width of the river "a man can make himself heard on the other side," that there is no traffic on the river except at the ferries, no one will venture down it either, by boat or raft, on account of the water being so "bad", (—swift and disturbed—and the channel very rocky.) They also assert that there is no good road along its banks, but merely a difficult track here and there beaten by the *monkeys* and fishermen; and that "very wild tribes, (Lawas and kachins,) inhabit the hill on either side."

Starting from Ho-too we ascend very steeply the south side of the vale to the ridge top, wind along a short distance. and descend into the vale on the other side, the stream of which is running westward; we follow up this narrow vale, cross its stream, and ascend again steeply to east, then move gradually to south-east, a long ascent, to the village of Kam-pôn. Here the reading of the Aneroids at 7-30 A. M. are (D.) 26·705 (C.) 26·699, Thermometer 58°.

From Kam-pôn we descend over a small open lawn, and cross a higher part of the same stream we passed a short way back, but here running from the south-west; we ascend and go winding along on hills of no great height apparently, but shortly find ourselves on the brow of a tremendous precipice to the east; turning southward along the top we soon gain the highest point; here at 8 A. M. the Aneroid readings are (D) 26·611 and (C) 26·594, Thermometer 65°.

Beyond this precipice nothing is visible save the dense fog resting below; looking down more than a thousand feet into the great abyss, the effect is most peculiar, one might almost fancy he had actually arrived at the unattainable edge of the horizon, or, as it were, the end of the earth.

Here we are about 2,000 feet above the river bed and within, as may be, a stone's throw, or less than a mile at the most.

Continuing along this ridge of hill, that runs about north and south, we descend first gradually and then more steeply to south-east by a spur from the main ridge, still descending, now steeply, now gradually, now winding along the sides of hills, our direction is more easterly and often due east: as the fog begins to clear a huge range makes its appearance beyond, growing higher and bigger as we descend lower and nearer; and now we catch a glimpse of the river still a long way below us, it looks like a very large hill stream. We reach it at a spot where a mountain torrent from the northwest runs in, and has caused a sand bank to be formed, fifty or sixty feet in thickness above the present level of the river.

The Soo-kât ferry is not quite half a mile from this spot up the river. There is no village but a house or two on the left bank inhabited by the ferry-men; indeed we could not find a level spot of ground to pitch a small tent, for there are no banks properly so called, the hills

rising directly from the shores of the river: the shores are irregular, and consist of hard rocks with dislocated fragments in heaps, and large sand-banks intervening between the more prominent rocky points; this sand, which is of the finest grain, is very micaceous and of a grey colour. Some of the rocks are a kind of obsidian and have the appearance of compact slag as from a furnace; others are encrusted with the same; some beds are shaly, slaty, and also chloritic, foliated and contorted; others again are hard and siliceous, the several facets of these, indeed the whole of their exposed surfaces, are beautifully polished by the friction of the sands; pebbles are very scarce and only found wedged in the clefts and cavities of the rocks, or as a shingle bank near the mouths of the larger mountain streams. Most of the hard rocks are coated with a peculiar black polish resembling, in appearance only, black lead, but is, I believe, an oxide of manganese only.

Soo-kât ferry is in latitude 21° 56' 0" N., being about 450 miles from the mouth of the river at Martaban., Its elevation is 1,050* feet above the sea level, the average inclination therefore of the river bed is about 2·34 feet per mile.

The shores of the river at Soo-kât are about 240 feet apart at the water's edge, but must be double this distance during the floods, that rise to some ninety-five feet above the present level in the month of August; the ordinary flood marks were 60 or 65 feet above the present level.

The body of water in the river is here flowing swiftly and turbulently boiling up, as it were, in places: it is very deep (eight or ten fathoms at the least), for some soundings I took at the shore were over seven fathoms: it was impossible to remain out in the stream without strong ropes and anchors.

The ferry-men take advantage of a strong back-water on the right side, where the river is widest; but just above this the channel is contracted by rocks projecting from the right shore, where a two hundred feet cord will reach across: again, about a quarter of a mile below the ferry, the whole volume of water passes between rocks not a hundred† feet apart; here the depth could not be ascertained, the velocity of the current being so great, almost a rush, noisily chafing its rock-bound channel. But these rocks are only about 20 feet above the present level of the river, and must be deeply submerged during the floods; they are slaty, and somewhat shistose, and might readily be removed by blasting. The river winds considerably in these parts, and is so shut in by hill that not more than a mile or so is visible from any one point. The natives (ferry-men included,) would not venture down it, by boat or raft, at any price. They say that coolies can make their way down the left bank for many days' journey, and also up the river for about three days to where there is a ferry, and then the pathway is continued on the right

* The actual level of the water at this season (March 22nd) is about 40 feet less; the instruments, in the above calculations, being at camp on a sand-bank.

† A cord stretched across at this point from rock, to rock measured ninety-six feet.

bank northerly; that it does not keep to the river side, but goes inland some distance. I was also informed that above, the stream runs much swifter and more disturbed, the water rippling in small frothy waves.

Having collected coolies sufficient for our small kit, we cross the river at Soo-kât ferry, and proceed down its left bank. (I found it impossible to keep up any thing of a route survey, for time is no measure of distance while travelling over such country; the path way too was so irregular, changing its direction every few minutes.) For some distance we keep along the winding shore, passing over great sand-banks, some of which are scarped more than 60 feet to the water's edge, now following the foot track along the steep side, or clambering over the heaps of detached rock. The rocks are chiefly hard sandstone and shales, much compressed and contorted, dipping irregularly to a little west of north, at angles varying from 30° to 90°.

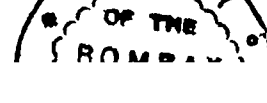
At the ferry, the river is running from N. 30° E. and from the ferry, to about south-west for nearly half a mile. Just below that, the current is very swift and the direction of the river is about W. 35° S.; it widens in front to some 300 or more feet,* and here there is good smooth water flowing to the south-west. Rather more than a mile below the ferry, the river is directly contracted, by rocks on the right side, to about 180 feet in breadth.

Here we cross a very picturesque and noisy cataract, a small tributary, there is another also a little further down on the opposite side. The river is now running to W. 40° S.; smooth beds of hardened shales on the opposite bank dip S. 40° E. to the water's edge at angles of 35° to 40°. About two miles from the ferry another obstruction occurs in the shape of an ugly mass of white compact rock about a hundred feet long, in the bed of the river on the off side; here the stream has to make its way through a passage of about 100 feet in width, and the water descends with great velocity to some three feet lower level, but not in a drop or fall, for the channel here, though narrow, must be very deep, the water is of course much disturbed, rolling along in foaming waves.

These rocks are well covered during the floods, they look like crystalline limestone in appearance, being white and water-worn in holes. The path shortly leads away from the bank, and we mount some of the spurs, that come down from the hills to the eastward; winding through dense jungle, we descend to within a short distance of the river, where the din of rushing water is heard below; it is caused by a barrier of rock, that strikes across the bed of the river, and is dipping to the N. E. at angles varying from 25° to 30°. This is an immovable obstacle, for the rock consists of sedimentary beds that have been fused or semi-fused† into the hardest siliceous rock, that would defy the best steel

* This and all subsequent estimations of the width of the river are mere guesses, and not actual measurements.

† The beds are curved and waved, giving unmistakable evidence that they have once been in a fused or semi-fused state.



chisel; nevertheless the river has forced a passage, and broken its way through in three or four places: the broadest is not more than 30 feet at the waters' edge, but is wider above, being somewhat V shaped. These rocks rise high above the water, and although there would be a broad enough channel during the floods, still it must always be a very ugly and dangerous part.

Some idea of the force of current may be learnt from examining these rocks; although they are of the hardest kind, compact, siliceous, and even vitreous, yet they have been scoured in furrows and worn in deep holes, by the trituration of well rounded pebbles of foreign rock, such as horn-stone, green-stone, porphyry, &c. The surface of some of the rock has received a fine polish. On either side the river, huge masses and slabs lie scattered in heaps: the pieces of wood, seen among the rocks, are worn like pebbles of stone, and mostly have fragments of gravel deeply imbedded in either end.

The level of the water below the barrier appears about 18 inches, or two feet lower than above.

On the opposite side, a broad bedded stream empties itself into the river, just above this barrier; it runs for a short distance from the south of west, and I think advantage might be taken of this, if the river were deemed worthy: a few hundred feet up this stream, a passage might be cut to the river below the barrier, and thus a side channel, avoiding the barrier, be opened. The operation would not incur a very great cost, unless the hard rocks of the barrier strike along right through; but I am inclined to think this is not the case, that there must be a fault that intercepts them, otherwise the stream from the hills could not have cut so broad and deep a bed. (I should like to have crossed over, and examined the spot, to determine this point; but time and circumstances would not permit.)

Having regained the road, or rather pathway, we turn up a contracted vale to the S. E. (for there is no way along the river shore), and then ascend southward, among thickly wooded hills, till we arrive at a village called Maw-pwâ; this may be about six miles from the Soo-kât ferry, and 800 feet above the bed of the river, but the hills around appear to be about 2,000 feet.

Following the pathway from Maw-pwâ, we wander among steep hills, ascending and descending in a direction first south-west, then more westerly, and twisting about even to N. N. W. At about two miles from Maw-pwâ, we descend to within sight of the river; here it is tolerably broad, say 300 feet, and flowing smoothly on, between its broken rocky sides; there is a foaming cataract on the opposite side, the water of some hill stream falling noisily down the bank into the river.

Proceeding on, we loose sight of the river, and pass through dense jungle again for some distance, but eventually come out on to the shore of the

river where there is a small ferry but little frequented. Here the river is broader, (about 400 feet the average), occasionally widening in bay-like recesses, where there are large sand-banks sloping down to the water's edge: there are two or three small rocks rising some few feet above the surface of the water, but they are not in the main channel.

The current runs swiftly at a rather contracted part, caused by a ridge of rock projecting from the left bank, and dividing the bay-like recesses. These sandy bays would form a good place for anchorage and rendezvous; and the deep glen, intersecting the hills on the opposite side, looks a promising way into the interior of the country.

From this point, the river runs south for a distance of about three quarters of a mile, where there is a small level bit of ground, the site of an old village: a quarter of a mile further on, the river runs to S. S. E. The road does not continue along the river bank, but winds, a little distance from it, along the sides of the hills; about another mile further, we cross a stream of water running from the east, not an inconsiderable one during the floods. One mile more, and we reach the village of Bam-pân, and its small bazaar, on low ground near the river bank, and at the junction of a broad stream, that rushes impetuously, at an observable inclination, over its pebbly bed into the river.

This would be a very large stream, but for the lowness of level of the Salween, which causes a great drain on the country; nearly all the streams fall as cataracts and cascades into the river.

There is a large village, designated a town, called Nam-pa-loom, about a mile or little less up on the hills to the north-east, where the "Tsawbwah" of the district resides.

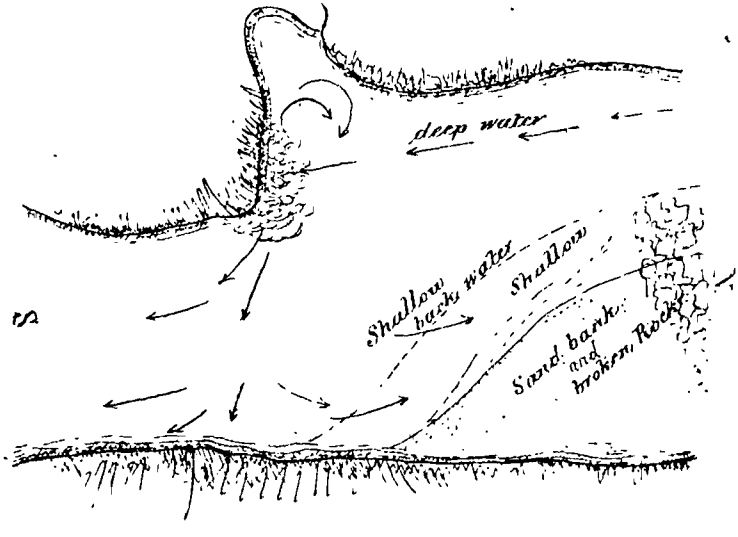
They tell us that when the water in the river is higher, they take rafts of bamboo, loaded with rice, down to one of the ferries below, a distance of two days by water, but five or six days by the road along the river bank; but at this period, the rocks appear above water, and the passages between them are too narrow, and that there are two or more falls or "cadins," beside another "barrier;" this information was not altogether correct, as we shall see.

The betel-leaf vine is grown extensively on all the level patches of ground about the mouths of the streams, especially in the neighbourhood of Bam-pân, where there are very large plantations of this vine, for here the hills do not rise directly from the shores of the river.

In the river bed near Bam-pân, there is a very extensive sand-bank about 300 feet broad, and the channel is contracted to about 200 feet; a rock is seen in the middle, and another, larger, at the edge of the sand-bank; the water is flowing very swiftly; and the channel in front is narrowed to about 150 feet, by shoals of pebbles and boulders; there are also a few isolated rocks in the sand-bank, and a coarse pebble conglomerate cemented by a black arenaceous matrix of recent date.

The river is here running to the south; when about half a mile from the village, it bends to S. S. E. and S. E., then takes a rather sharp

turn to S. 10 W.; here at the bend the channel is not more than 200 feet, there is a heap of broken rock on the north side of a small hill stream on the west bank of the river, and a high sand-bank on the east side with much rock scattered near the water's edge, also the remnants (as it were) of a "kyouktan," over which the water rushes noisily and foaming. About a quarter of a mile farther to southward there is a very awkward place in the river; on this side is shallow water, caused by a shoal of pebbles and sand that extends out some two thirds of the breadth of the stream. The deep water is on the off side close slong some steeply faced rocks, where the current rushes by very swiftly, till it meets abruptly a mass of rock extending from the west bank, against which it strikes and is rejected to either side, the one on the off whirling round rejoins the coming rush, while the other sweeps diagonally across the stream, a large portion running up as a backwater over the shoal above mentioned.



At the face of the big rock, where there is a great foaming and loud roar, the water can be distinctly seen elevated some two feet or more above the general level of the river.

A raft would have to be dragged through the shallow backwater, I think a boat might be steered down the current, and be kept clear of the rock; but a large vessel, as a steamer, would almost inevitably come to grief. There is deep water, apparently, between the projecting corner of rock on the west side of the river, and the rocks below the shoal on the east bank, a distance rather less than 200 feet.

The rocks are hardened shales and sandstone beds dipping to the south-west at angles of 15° or 20°.

Just below, the river widens in small bays on either side; but in front it is again rock-bound with steep broken sides; the water, smooth and deep, is flowing to the south-south-east.

Following the pathway, we now ascend and descend very steeply over hills and spurs, and again strike the river about a mile and a half to the southward, where there is a sharp turn in its course: the river comes from the N. N. W. but ultimately bends to E, then round to S. S. W. and then goes on south. This is indeed an ugly rocky turn, but the water is flowing smoothly and slowly, and it appears to me that a skilful helmsman might steer his vessel clear, for there is room enough in the sandy bays to move about, but just above this turn there are three or four rocks, projecting many feet above water, that must be dangerous during the floods when the current runs strongly.

The rock is slaty, greatly contorted, and much intersected by white quartz veins; this looks promisingly metalliferous;* the river has cut its channel across the strike of the beds.

Continuing on down the side of the river, we pass a long sandy island, here the river runs about S. S. E., and in front widens to about 300 feet for a short distance, but is again contracted by shoals or banks of sand, pebbles and boulders to 150 feet (but during the floods it continues about 350 feet or more); here the water is swift and turbulent, in front it again runs between rocks 150 feet apart, then just below widens out in a bay of the finest sand; (there is a slaty rock in the middle of the channel, about the size of a couple of huts.) (Here there is a small village on the opposite bank.) We cross a cataract falling over nearly horizontal slabs of compact argillaceous rock, and pass some high masses of blue limestone.

The river again takes a sharp turn, sweeping round a sand bank supported by rock below, then a great shoal of pebbles and huge boulders roughly rounded, that have been arrested in their progress down the river by a large mountain stream from the east, that here empties itself into the river falling over the southernmost extremity of the shoal. There is a great rush of water in the contracted channel of the river.

Beyond the shoal the river is running southward, and there is a sort of rapid over a submerged "kyouk-tan," where the water is very swift and noisy.

In front the river runs to S. 30° E., it has a tolerably broad and regular channel between sloping pebbly banks; but I imagine it is comparatively shallow with an inclined bed, for the water runs with great velocity almost as a rapid. About a mile from the bend, we cross another large foaming stream from the hills, and here again, on the north side of

* Indeed the sand of the river is washed for gold in many places farther down.

the stream's mouth is a great pebbly bank which contracts the river to about 130 feet; just before this the current strikes and splits upon a "kyouk-tan" from the right bank, but the main channel is not narrowed, the "kyouk-tan" being at an acute angle does not extend far into the river. On the left bank just beyond the hill stream, there are high rocks nearly vertical, dipping to W. 37° N. ∠ 75°; the river is here running very turbulently to S. 10° W., but a quarter of a mile farther on, it has a good broad channel 250 or 300 feet across, is rock-bound, and sandy in parts; the water flowing strongly but steadily to S. 10° E.

The rocks are slaty and shaly, greatly contorted and crumpled; the river beyond narrows to about 180 feet for a few yards, and then in front widens in a bay on the left bank to 450 feet: here there is a small rock in the middle of the channel, and in front are some vertical rocks that would be dangerous during the floods; farther on the current splits upon a great slab in the middle; there are also insulated big rocks near the left bank, here the water is very swift; (the river in these parts must be some 6 or 700 feet broad during the floods;) again a short distance in front, the river has cut through a great "kyouk-tan," but two little rocks remaining above water.

Now we ascend the bank, and lose sight of the river for a short distance, meeting it again where the channel is contracted to 200 feet or less in width, by long boulder banks on the left side, the water here is swift; in front the channel is only about 160 feet, where it has cut through shaly beds dipping irregularly to the west at high angles. Again the channel widens to about 300 feet for a short distance, but narrows again in front to its normal width; then there is a rocky mass that extends from the left bank nearly two-thirds across the bed of the river, contracting the present channel to about 130 feet for a short distance. The river must be very deep on the off side, the current is flowing swiftly and smoothly except just below the rock mass where the water boils up, as it were, very turbulently at times: but along the left side, where there is strong back-water, it is comparatively shallow both above and below the big rock.

Here we encamped on a high sand bank, on the afternoon of the third day's march from Soo-kât ferry, for we now found that it was impossible for coolies with loads to proceed any farther; indeed it was most difficult for a man without any load to get along the rocks in front, and had it not been for the timely counsel and assistance of some men from the village opposite, we should have been obliged to turn back.

These men persuaded us to proceed to the Tâ-caw ferry by raft down the river, telling us that Tâ-caw was at least 8 days' journey by land, whereas a raft would reach there in about two or three days: they also assured us that they, and their fathers and grandfathers before them, had, on certain occasions, taken rice in large quantities by rafts down to Tâ-caw ferry, and although there are four or five falls and the noted "three rocks" to pass, yet under the protection of "Nât" of the river

they had always gone safely. We therefore accepted their offer to take us down the river to Tâ-caw, and by the evening of the second day they had built and completed a capital bamboo raft 45 feet by 18 or 19; the upper floor, 14 by 12, was raised 3 feet above the lower.

On the following morning, the men having first invoked the river-"Nât" with offerings and prayer for the safety of the raft, we embarked and pushed off.

I will now continue the description of the river in the form of a timed diary.

March 31st, at 7-25. A. M. Having got well into the current on the off side, we move steadily along, gradually increasing in speed towards the first fall a few hundred yards in front, just at a turn in the river from running about south, to nearly south-east. The banks are high and rocky, and the hills rise directly from them. (Within twenty minutes after starting) we are speeding down the rapid (or fall of about three feet) and into the boisterous water below, dashing along through great waves that bend about the raft as whalebone, severely testing its strength and swamping a portion of the upper floor, but every thing was well secured and lashed to the raft. At this fall the river is contracted, and the water, reflected from either side, and perhaps from the bottom, meets in the middle and dashes on in large foaming waves as of a chopping sea.

At 7-43. A. M.

At 7-48. A. M. We are quickly borne along and are descending the second rapid, (the fall is greater and more abrupt, being about four feet) with great waves and roaring sea on below; but continuing on we soon get into smooth water 350 feet or more broad: the direction is about S. 35° E.

At 8-12. A. M. We descend another smaller rapid and turn S. 25° E.; we pass a hamlet on the east side, very steep hills. Our average rate of progress appears,

At 8-16. A. M. at a guess, to be about six miles per hour. Now we are in disturbed water, a rocky irregular bottom I imagine.

At 8-20. A. M. Going much slower (say 4 knots an hour), again,

At 8-25. A. M. in front faster say five knots, going South 10° East.

At 8-35. A. M. Going South-East about four knots in an hour.

A large sandy bay on the right side, going about S. 40° E. passing

At 8-39. A. M. a cataract over the right bank from a hill stream;

At 8-46. A. M. descending a small rapid, disturbed water running

At 8-47. A. M. swiftly between rocks 100 feet apart; there is a huge insulated rock just beyond near to the left bank, here the river is broad again.

At 9-12. A. M. We now go along very slowly, twirling and circling round and about with the stream, but in front the current is stronger, and reflected from side to side by rocky parts, and boulder points jutting out from the banks into the river.

At 9-15. A. M. Passing a small fall and noisy rapid at great velocity: the water just beyond is much disturbed, boiling up and reflected from side to side. After getting clear of this bad water we move along slowly to south by east for some distance;

At 10-0. A. M. passing several cataracts on either side, one of these hill streams has caused a deposit of pebbles and boulders just on the south side of its mouth; here also is a big rapid with a fall of eighteen inches or so, below which the current runs in a semi-circular form striking off from rock faces on the right, across to rocks on the left bank, the water foaming and irregular.

In front we pass slowly down a long reach of smooth water that

At 10-28. A. M. widens in one part to some 400 feet; we pass a very small rapid or rather swift water, caused by a broken rocky heap on the right side, just beyond the mouth of a small hill stream.

The river now continues narrowed and rock-bound: the water is

At 10-35. A. M. turbulent, flowing to S. 35° E.; we are but a short distance before reaching the largest "hât" we have to pass, a clear fall of about five feet; the surface of the water has

At 10-40. A. M. a considerable slope towards the fall, down which our raft glides with increasing velocity into the chopping sea on below. The upper floor of our raft is again swamped by the foaming billows that toss us about as a walnut-shell, now in a trough with huge waves on either side, now mounted on the crest of another and descending beyond; we at last gain more quiet water but still speed along fast. At the fall the river was about 130 feet wide, now it contracts to less than a hundred (say 90) feet; and there are some rocks rising high up, near the right bank, that must be very dangerous during the floods. The river, still rock-bound, winds and then goes on South 25°

At 10-54. East, rather broader but still running swiftly: it widens to 300 feet, water flowing smoothly; direction to S.S.W.

The river is not more (apparently) than 85 feet broad, between ver-

At 11-21. tically cleft hardened beds, contorted and crumpled, and but slightly incline above the horizontal. Just beyond these rocks, the river widens again to three hundred feet;

At 11-27. going along very slowly down a long reach of smooth water towards "the three rocks."

The current increases in speed as we approach these noted rocks;

And at 11-40. we are passing between them, descending a fall of nearly two feet. They are, in fact, portions of a great "kyouk-tan" or reef of rock across the bed of the river, similar to the "barrier" above described. The right side of the river is rocky, then there is a passage of about 30 feet, then a small rock and another passage of 30 feet, then a great long mass of rock rising high (20 or 30 feet) above the water, and then the third and widest passage (some 60

feet or more) between the mass of rock and the left bank. (The rocks looked hard and splintery). We took the middle 30 feet passage, and it was a close shave for our raft; indeed we did touch the rock but no great damage resulted. The water here was not boisterous, but in the broader passage they say they could not steer clear of the rocks, for the current sweeps round the left bank, and is very irregular and disturbed.

From this fall the river runs to S. 20° W., and our raft again goes twirling about very slowly; we pass a projecting point on the right bank, and the water flows swifter as we approach another roaring rapid, caused by a bank of boulders and broken rock, jutting out from the left side and sloping off to a point round which the west bank sweeps; and the current, directed from the point, strikes across and dashes against the opposite bank of vertically cleft rock.

At 12-11. We are passing this point, the breadth of water channel is about 120 feet, and the fall altogether about 2½ or 3 feet, a chopping foaming sea below, the water running very swiftly.

At 12-15. The river is again broad and smooth, flowing to S.S.W. Here some buffaloes on a sand-bank are the first indications of agriculture that we have seen for a long time.

At 12-18. P. M. There must be a sort of submerged "kyouk-tan" from a rocky broken mass on the right side of the river, for the water is much disturbed and the current is directed across to the high steep-faced rocks of the left bank, consisting of beds of compact calcareous clay-stone of a blue-gray colour: they are nearly horizontal, and the steeply cliff faces on the river side are weathered and water-worn in a remarkable manner, like icicles up-turned, also in long vertical grooves. Huge detached masses of this rock lie scattered on either bank, giving a very imposing appearance to the river.

At 12-22. P. M. We pass a small ferry, and a village on the left called Tat-sin.

At 12-27. P. M. We pull up till 1-23 P. M., when we continue on our course slowly (3 or 4 knots per hour) through smooth water of good breadth (300 feet or more) in a direction S. by 10-15° W. The rocks here appear highly calcareous, if not limestone itself.

At 1-47 P. M. A large stream the Nâm-Khâ, by report as large as the Salween itself, but apparently not above 60 feet broad, joins the river on the left side, flowing in flush with the Salween waters; but inside the mouth of the Nâm-Khâ, the water is rushing impetuously down a gentle incline between high rocky sides. This is the first tributary of importance that we have seen. Just beyond the mouth of this stream, the Salween River widens out in a circular form, but in front, where it turns to W. 5° S. is again rock bound and contracted to its normal width by the same compact calcareous beds nearly horizontal, and then the black and siliceous hard rocks come in again, at first parti-

ally interbedded with the limestone. We pass an ugly large but low
At 2-0 P. M. rock of the same in the middle of the river: broken rocks in masses and great slabs also lie piled about on the banks.

We descend a small rapid or fall of about a foot or eighteen inches, off one of these rocky points projecting from the left bank, where there is a great rush of water, and much commotion, strong eddies, &c. beyond; but nothing compared to that at the former falls.

We are rounding a great rocky mass on the right side of the river:
At 2-7 P. M. the water here is "bad," boiling up and in whirlpools and eddies, (carrying down one side of the raft) with strong undercurrents.

This bad water continues for some distance, the river winding to the westward.

We pass a rock island on the left, and descend a long gradual slope
At 2-12 P. M. of much disturbed water, moving along fast; there are rocks about, but the river is very broad.

Still in this apparent slope, passing a low reef of rocks towards
At 2-15 P. M. the left bank, the channel on the right side of this reef is about 90 feet wide, and that on the left side not more than 30 feet.

At 2-18 P. M. We get into quiet water, but still flowing fast; a large hill stream falls into the river on the right.

At 2-20 P. M. There is a rocky point, and the water of the river boils up, as it were, turbulently. We are now going about W. S. W. and at 2-26 in smooth water again, moving along steadily towards the S. W.

At 2-37 P. M. The rocks of the river bank are here vertical, but in front are again horizontal or nearly so; these are all of the dark hard and shaly series.

We pass a small village on the right; the view around is more open,
At 2-45 P. M. and the hills are not so high. The river, from being very broad, narrows to about 270 feet, and here the water is running faster and somewhat turbulently in a direction rather North of West.

We pass three or four low rocks in the river; there is a good breadth
At 2-55 P. M. of water, but just in front, a "kyouk-tan" from the left bank, contracts the channel to about two hundred feet or rather more.

At 3-7 P. M. Going down a gradual continuous rapid, swift disturbed water, chopped and broken but not rough.

At 3-10 P. M. A hill stream on the right has cut its bed to the river level.

At 3-15 P. M. River open, broad, smooth water flowing gently on (at 3 or 4 knots) low sloping hills on either side.

Excclerating, swift, surface water slightly disturbed, we pass
At 3.25 P. M. another village "Mine-toom"; here the river is not so wide (say 220 feet) between high banks of thinly bedded rocks nearly horizontal.

At 3-30 P. M. Direction of river a little to the east of south.

The river is now smoothly flowing to the S. S. E., a broad regular
At 3-50 P. M. channel; we pass an extremely picturesque cascade, foaming like snow down the high bank, and encrusting the rocks over which it falls, with a thick deposit from its calcareous water.

We pass another cataract on the left, but this stream has cut a deep
At 4-o'c. P. M. and narrow gorge through the rocks; the river is now running to South 30° East: and at 4-10 to
At 4-21 P. M. S. S. E. again very broad. We pull up at a sand bank near a village, and make fast for the night. Shut among hills as this river is, the days close in early, for the sun is only visible from about 8 A. M. in the morning to 4 o'clock in the afternoon or soon after. We have come, I imagine, a distance of about 25 or 30 miles to-day.

April 1st. We start at 6-5 A. M. and proceed on smoothly but not very slowly.

At 6-40 A. M. A high mass of rock in the river on the right.

A long reach of smooth water flowing gently, direction about S. 35°
At 6.45 A. M. E., channel broad: small streams from the hills, occasionally contribute their waters falling in cataracts down the banks of the river.

After 7-o'c. A. M. The river runs about S. S. E., or rather more southerly, all smooth water, going about four
At 7-20 A. M. knots an hour. It turns to S. 30° E, at this bend, the river is very wide about 600 feet; here there
At 7-35 A. M. is a village on the right side. Again a sharp bend in the river, and just before this we passed some rocks; first a small one, then, a couple of hundred yards in front, a huge insulated rock, consisting of the dark beds below, supporting the limestone: but the river is wide and the passages on either side broad enough.

At 7-40 A. M. A large stream flows in on the left bank near the village of Ho-yaw; going S. S. E.

A low shoal of pebbles extending from the right bank, causes the
At 7-44 A. M. current to be directed off from it to the opposite rocky side, where the water is disturbed and flowing swiftly; there were a few natives occupied in washing for gold among the sand and pebbles of the shore. After rounding this shoal there is a long reach of fast flowing water to S. 20° E.

Direction more easterly nearly, south-east. Again, E. 20° S. still
At 8-25 A. M. smooth water, and now going very slowly, for the
river is broad and the channel regular, about 400
At 8-50 A. M. feet across; very high hills are seen in front, a long
way off to eastward.

At 9-50 A. M. We have been moving along very slowly, the direction now is to S. 30° E.

We pass a long high rock with vertical sides and smooth faces,
At 10-o'c. A. M. apparently an island, on the left side of the river:
the channel between it and the right bank is not
much more than 250 feet. From this the river runs S. 40° E., we pass another foaming cataract on the left side, and a hamlet on the hills to the right.

At 10-33. A large rock on the left; river broad.

We have passed several villages and crossings, the river is still
By 12 o'c., (noon). very broad (about 400 feet), its direction S.
20° E.

At 12-7. The water is disturbed in places, as though there were rock below.

Going south. The river widens out in a basin shaped form nearly
At 12-10 300 yards across, partially enclosed in front by a
low shoal or bank of pebbles and broken rock that
At 12 15. extends for a distance of 300 feet from the main
bank on the right; here the channel is not more than 300 feet wide, and the water is running swiftly.

We pass a large village called Ban-pain, on the right bank where
At 12-28 there are some cocoanut trees. The water again
runs swiftly and disturbed as we near another large
shoal that deflects and contracts the channel for a short distance.

At 12-35. A large and impetuous hill stream discharges itself at the right bank: a prominent conical hill is seen to westward.

Several boats were observed about here, and there are villages on
either bank: the country is apparently more open
At 12-40. and cultivated, no high hills being visible in the
vicinity of the river.

Another large stream falls into the river on the right side, dividing into three very picturesque cataracts down the
At 1-7. rocky bank. The river turns S.E., flowing very
slowly.

Passing a high rock with a small pagoda on its summit. This big
At 1-15. rock, insulated during the floods, is now connected
with the right bank by a sandy shoal that extends
some distance below the rock.

At 1-30. Fine broad river flowing to S. 30° E, at about two or three knots per hour.

At 1-40. There is a long sand-bank on the right, and a village, Bam-boom, with cocoanut and other palms;

At 1-50 beyond this, the river takes a very broad sweep round to the south.

We are approaching a small rapid, the river being very broad the fall is scarcely perceptible; though the water, just

At 2 o'clock P. M. beyond a line across the surface, is disturbed and running swiftly, specially on the left side, where it roars over some low rocks that form part of a conglomerate bed, of quartz and other pebbles with dark matrix, lying horizontally in the sandy shore. There is a small village up on the bank. The bearing of the river is again to S.S.E, its average width nearly five hundred feet.

We are going along faster, and the water is strong and turbulent as

At 2-10. we round a big mass of calcareous rocks on the right side: after passing this, the water is smooth and broad again.

We have passed two or three villages, the last a large place, below

At 2-50. which there were a number of gold washers on the pebble bank, that extends out from the right side of the river, causing a sort of rapid.

At 2-55. The water is again much disturbed near the right bank. After 3 o'clock we move along

At 3-8. very slowly, and the direction is southerly.

We enter a bend in the river, the channel sweeping round a very

At 3-15. extensive deposit of boulders, pebbles and sand on the left bank, at the mouth of a large stream that has partially cleared its way through this deposit, and dashing over the boulders, rushes impetuously and with much noise, down to the river. At this point, the water of the river is very turbulent, and the current running swiftly. Having passed this great bend we shortly arrive at the Tâ-caw ferry; where the river, though very broad (between 4 and 5 hundred feet), is flowing on still very swiftly to the southward.

There are high and almost precipitous hills to the east, intersected by a great gap or contracted valley, through which the large stream above mentioned is said to run. A long straggling village is situated on the left bank of the river, and a small one up on the west side.

The river here must be at least 700 or 800 feet wide during the floods, that rise to about 40 or 50 feet above the present level.

On the morning after our arrival at the Tâ-caw ferry, I observed that the river had risen two feet or more during the night, and the velocity of the current appeared greatly increased, * and by 8 o'clock P. M. of

* Logs, rubbish, and old rafts, hitherto lodged among the rocks, came shooting down at great speed.

the same day (2nd April), it had risen in all about 4 feet: but this, we were told, was not the commencement of the great floods that occur in July and August.

The difference of level between the Soo-kât and the Tâ-caw ferry is about 140 feet; the latter being about 850 or 900 feet above the level of the sea.*

It was reported that there are five falls in the river between Tâ-caw and the Keain-toung and Keain-khan-gyee ferries,† about the latitude of Moné. The first of these falls is met about half a day's journey below Tâ-caw, (where the river is said to be contracted to within a stone's throw across). It is a fall of several feet, so deep indeed that no one has ventured down it; but we were informed that raftsmen, when taking loads occasionally to Nâ-loon or Tse-bmine on the river below, had unloaded above the fall, and weighting their raft with rock, had let it go; then, catching it again below, had reloaded, having carried their goods round by land.

From the above description of the river, it will be evident that the Salween is not a navigable river for either boats or steamers at this season of the year; and that when the river is full, and the surface of its waters even, the velocity of the current must be so great in parts, that no ordinary steamer could be propelled up it.

Having relinquished the idea of making any further progress down the river, we left Tá-caw on the morning of the 3rd of April, and reached Lé-deah on the 8th idem, by a road already described: from Lé-deah we retraced our steps to Té-thone and Pway-hla, the latter a large village, a short distance to the north-west of Kyouk-tat.

Leaving Pway-hla we proceed westward by the high road that leads out of the Shan state and down to the town of Hline-det,‡ distant about four days journey from Pway-hla.

This road is said to be the best, and is the one by which the Burmese march their troops into the interior of the Shan states. In the first march form Pway-hla, we pass through open country or up-lands, in a direction south of west for about seven miles; then among jungle and hilly ground, there is a narrow rocky little pass or defile to get through, (very difficult for loaded bullocks or elephants,) and then a good broad road gradually descending to the north-west; here the country is thickly wooded, except near several small hill-villages where there are clearings and much cultivation, for the ground is humid and the soil good. The road passes over one or two anteclinials or spurs and then zig-zags down a

* According to the Aneroids; the Boiling point Thermometer makes it rather less.

† There are four Keâins, namely, Keâin-tin, Keâin-toung, Keâin-khan, and Keâin-yong, situated to the East of the Salween, but is impossible to determine their positions from mere descriptions or report of the natives. Keâin-yong is said to be the largest of these towns, and was formerly noted for its gold mines and a large trade in silk, &c., but considering how very much these towns have declined of late years, it is very probable that the Chinese have pretty well exhausted the mineral resources

‡ Or "Llein-dhu" as it is sometimes written.

steep and stony descent, to the Lé-byin or Tsin-goo tsakahn, near a village of the same name, situated in a small but fertile vale with a fine stream of water flowing to the north-west.

Leaving Tsin-goo, we cross the stream, and ascend by a rough and rocky road to the top of a watershed, that rises to the south in a high ridge with precipitous cliffs to the westward.

But where the road crosses there is a spur leading off, down which we follow, descending very steeply over stony debris, for a long way; reaching a dry rocky stream course, we follow it down for some distance farther, where it is joined by another from the south-east. On the descent we passed much calcareous tufa, or rather travartin, near a small spring, where it occurs in shelves and thickly encrusting the rocks. All this ground is arid and stony. Some iron-wood and a few small teak trees were observed among the scant jungle. The stream bed is now broad and less inclined, but still among hills; the rocks are of grey sandstone and grits, dipping at high inclinations to the north-east; there are also masses of a large pebble conglomerate of a reddish color. A short way on, this dry stream course meets the Ké-gouk Khyoung with much water flowing from the south. Crossing and recrossing this stream many times, we soon arrive at its mouth, where it joins a very broad rivulet called the "Myit." We now proceed *up* the "Myit", in its bed, which being flat, sandy, and very broad, has little depth of water at this season of the year.

Our direction is on the average westward, with steep and almost precipitious hills thickly wooded on either side; and farther up, where the bed of the "Myit" becomes irregular and rocky, with boulders well scored and polished, there is a cliff of blue limestone some 600 feet high, rising directly from the left side of the stream. On the same side there is a hot spring, issuing at a temperature of about 100° Fht, from white crystalline limestone. A short way above this, the "Myit" has taken a sharp bend, running from the south, round to the east. At this point we leave the large stream and continue on westward, ascending the bed of a small nullah, and pass over a slight anticlinal on to open undulating ground; and, turning south-west, and then south by west, we again reach the big stream near the village of Koo-gyee, situated on its west bank here level and open. The high hills, now on the east side only, terminate in great cliffs running north and south.

This "Myit" is said to join the Myid-ngé; it must have its rise somewhere near the "Tsin-toun-gyee" hill, and is—I am inclined to think—the same as the people of Ye-me-then term the Pan-loung Khyoung. It is remarkable, that after running to the north along the west side of high cliffs, it should turn eastward by a narrow pass or gap through them, for the country to the westward is comparatively open, rising in gentle undulations to no great height; the watershed that is crossed in going from Koo-gyee to Hline-det being not more than 100 feet above the former place, but about 700 feet above the latter.

There are two roads from Koo-gyee to Hline-det-myo, the one by which I went, supposed to be the shortest, was a distance of about 20 miles, and no water was found the whole way; this scarcity of water and the excessive heat of the season had proved fatal to many a bullock while on the march, whose carcases were still lying on the road.

The first part of this road follows up a broad sandy torrent bed that drains towards the "Myit," and then passes over undulating ground of gravels and sands much intersected by stream courses. In many of these broad stream courses some novel looking rocks were seen, a kind of trap or greenstone porphyry projecting through the sandy bed, and also a softish rock, light colored and speckled green and white. The rising ground distant about 8 miles from Koo-gyee, and forming the watershed above mentioned, also consists of similar crystalline rocks; all these are metamorphosed sedimentary beds; they disintegrate rapidly on the surface, from whence the sand of the streams is in a great measure derived.

After passing this watershed, blue clays and shales occur much crumpled; also dark shaly and slaty beds dipping at high inclinations to the S.W. and S. S. W.; but in front the crystalline and siliceous speckled rocks—so much like decomposing granite—again make their appearance in another rise or anticlinal; and then beyond, the hard shales and slaty beds again dipping to the S. S. W. The whole of this tract of country is stony arid and barren, for there is little or no soil. When about sixteen miles from Koo-gyee, the road descends a steep and rocky scarp on to low ground with a gradual slope to the flat alluvial plain beyond, that now stretches out before the unbounded view.

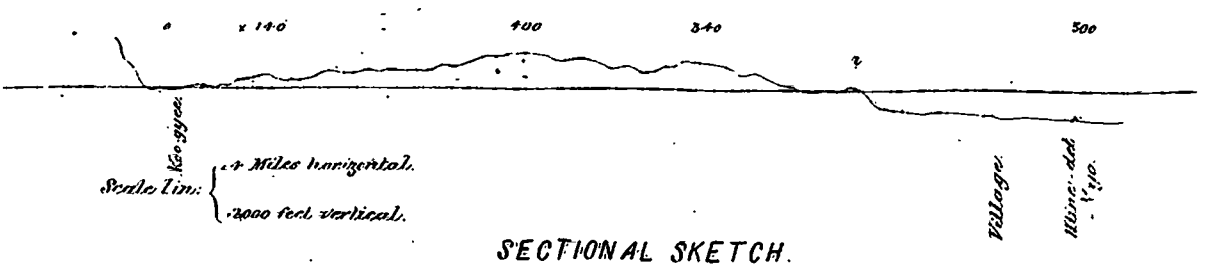
The sectional sketch below may serve to show the difference of level, between the valley of the "Myit" at Koo-gyee and the plain at Hline-det, and the intervening watershed.

The Aneroid readings at the principal stations on this road* out of the Shan States were as follow :—

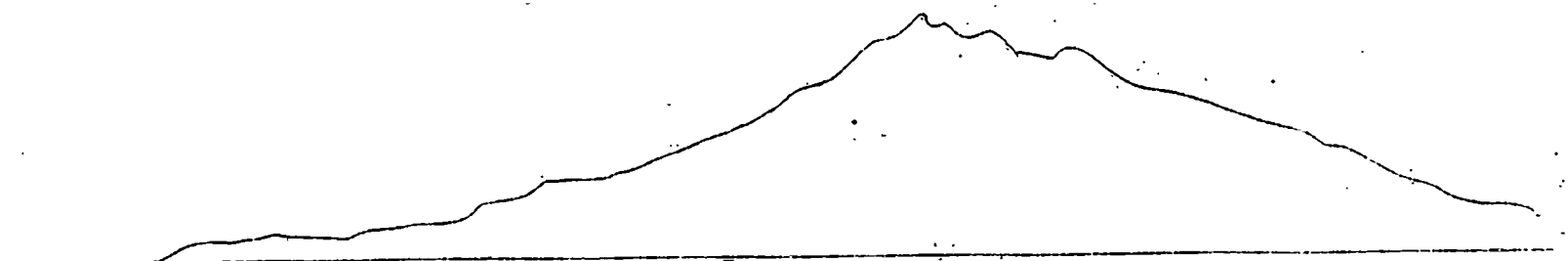
April 18th, Pway-hla	at 4-45	A. M.,	Barom. (D)	25·631	Therm.	64°·7
„ 19th, Tsingoo Tsakahn	„ 4	„	„	„	27·362	„	69°·7
„ 20th, Koog-yee	„ 4	„	„	„	28·550	„	72°·7
„ „ On the march	„ 8-30	„	„	„	28·164	„	80°
„ 21st Hline-det	„ 12	(noon)	„	„	29·039	„	103°·

The three descents be it observed, diminish in depth towards the plain, thus, Tsin-goo is about 16 hundred feet below the level of Pway-hla, Koo-gyee 11 hundred feet lower than Tsin-goo, and Hline-det 3 hundred feet lower than Koo-gyee; making a total of three thousand feet difference of level, between Pway-hla and the plain of Hline-det. The elevation of this plain is, according to the Aneroids, about eight hundred feet above the level of the sea; but the boiling point Thermo-

* The road leaving the Shan States by the Nát-teik pass is further to the north, and is said to be one long and continuous descent to the plain of the Irawaddee.



SECTIONAL SKETCH.



Paoppa Toung from the North East, distant 15 to 20 Miles.

meter makes it only 550 feet, and this, I think, must be considered the more correct altitude.

Hline-det-myo lies to the south of Pen-the-le and about 30 miles north of Yé-mé-then: it is five or six days' journey from the Irawaddee; the road down to the river, passes in a north-west direction to the town of Myin-gyan* about 16 miles north of Pagân. The first part of this road is across the flat alluvial plain; the Sam-mong Khyoung is met about two miles from the town, (Hline-det,) it is a shallow bedded stream and dry during the hot season; it drains from the south, and is said to join the "Myit" or Pan-loung. When about ten miles from Hline-det, the road passes over a very slight rise of sandy ground, and eight miles further, it leaves the plain and proceeds on through a gently undulating tract of country, of sand, gravels, and the outcrops of thinly bedded rock at low angles of inclination, and a soft or incoherent sand-stone with large nodular concretions: fossil wood also occurs sparingly in a more recent deposit. After passing the watershed, a low anticlinal in this ground, an extensive view is obtained to the westward, and the lofty hill of Paoppa now makes its appearance a long way off to the west-south-west; many large villages and towns are seen, and the road on the descent towards the river passes through several, all of which are well fenced round, and the compounds and roads hedged in with cut thorn-bushes and bryars. Within the large villages, there is generally an open space or barton for bazaar carts, &c.

When about north-east of Paoppa-toung, a better view is obtained of this extinct volcano, an outline of which is given below; its height, as estimated by Mr. Blanford, who ascended it in 1861, is about 3,000 feet from base to summit, the highest peak being nearly 5,000 feet above the level of the sea.

Before concluding this report, I would briefly remark, that a botanist would find great interest and, doubtless, many novelties in the flora of the Shan country. It comprises both tropical and temperate forms, and I believe he might make a long list of wild flowers there in common with those of England. I recognized among others, the Violet, Buttercup, Forget-me-not, Jasmine, &c., the Strawberry, and a large *Arum maculatum*. A yellow Raspberry is very common, the plant of which is not unlike the Blackberry bush; and a small tree without thorns but resembling the May in every other respect.

There is no lack of small game in the Shan States; Water-fowl abound on the tanks and jheels; Partridges and Pea-fowl are also very common, Pheasants not so, and the Jungle-fowl is quite a rare bird, but Pigeons of many kinds are plentiful in large flocks. The Cuckoo, though not a game bird, must not be fogotten, it visits the country about March and remains until the rainy season comes on.

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* Or "Myeen-kyan as it is written on Hule's map.

Hares are numerous on the grassy downs and plains, and a few small deer were seen. Large game is rare, there are however wild Elephants among the hills crossed before reaching La-sheoo. The Tiger also is to be found occasionally, in the more jungly parts of the low country.

FRANCIS FEDDEN,

Asst., Geological Survey of India,

and Scientific Officer of the

Late Salween Expedition.

RANGOON:

4th August 1865.

METEOROLOGICAL OBSERVATIONS.

PREFATORY REMARKS.

Thermometer (N.) by W. Newman and Co., Calcutta,—a good weather instrument taken as the standard in the tables.

Thermometer (F.) by J. F. Newman, London,—a small and very poor one mounted on porcelain, imperfectly graduated and so irregular, that it was discarded after the 20th January 1865.

Aneroid Barometer (D.) by Dent, Paris,—a serviceable instrument, but its capacity is not known; and its Thermometer (d.) being *detached* and of *spirit*, cannot indicate the temperature of the instrument and is much too sensitive. On the 1st of February, Thermometer (N.) stood at 42°, and (c.) at 40°, while (d.) read 34°: it had evidently gone wrong, for a dry deposit in the tube at 82°, showed a decomposition of a portion of the liquid.

Aneroid Barometer (C.) by C. Nephew and Co., Calcutta,—a sensitive instrument, but (unfortunately for measuring heights.) it is graduated only half way round the dial. Its Thermometer (c.) is mercurial, and inserted in the Aneroid.

The time at each observation was noted, but for the convenience of tabulation, they have been arranged under the three heads, "EARLY MORN." (before sun rise); "NOON" (or Afternoon) and "EVENING," (three or four hours after sun set). And in the tables, the exact time has been registered only, when it happens to be beyond the scope of that noted in the heading of the column.

F .F.

Early Morning, 4, 30 or 5 o'clock A. M.					Noon or After-noon.				Evening 9·9-30 or 10 P. M.					Station and Remarks.
		Therm.	Att. Therm.	Anrd. Barom.		Therm.	Att. Therm.	Anrd. Barom.		Therm.	Att Therm.	Anrd Barom.		
Nov. 12th						82°	80°	29·940						Off Monkey Point. (level of river at half flood) Rangoon.
,, 30th						76°		29·763						At Toungoo Station.
Dec. 8th						80°		29·642				December 1864.		At Myo-lha village, 30 miles north of Toungoo and 5 from frontier.
,, 9th														
,, 10th														
,, 11th														
,, 12th						84°		29·520						At Nyin-gyân Myo.
,, 13th						82°		29·54						Ditto ditto.
,, 14th						81°·5		29·56						Ditto ditto.
,, 15th	5-30	62°		29·472		82°		29·462	8 p. m.	70°		29·423		Ditto ditto and at Keedoungkan Tsakahn.
,, 16th	5-45	60°		29·423						64°	65°7	29·43		Keedoungkan and Shway-Myo Tsakahn.
,, 17th		54°	52°·8	29·380						65°		29·320		Shway Myo Tsakahn and Gyo-ben-kong.
,, 18th	7-45	56°	55°·3	29·345					8 p. m	68°	66°	29·318		Gyo-ben Kong.
,, 19th		54°	53°	29·287		80°		29·255	8-30	68°	67°	29·212		Ditto ditto and Nai-oung-kan.
,, 20th		57°	55°·5	29·218		76°·5	78°	29·230		69°	69°	29·233		Nai-oung-kan and Ye-mé-then Myo.
,, 21st	8-a.m.	63°	61°·5	29·263					8-30	69°·3	69°7	29·197		Ye-mé-then Myo.
,, 22nd	6-30	59°	58°	29·239		76°		29·257		69°·5	69°	29·272		Ditto ditto
,, 23rd	6-15	61°	60°·3	29·270						70°·7	70°2	29·31		Ditto ditto
	6-45	59°·5	59°	29·360		78°		27·33		68°	68°5	29.35		Ditto ditto (Barometer *rising*).
,, 24th								D C				D C		
	7-30	61°	59°3	29·406		75°	76°·8	29·335 29·380		68°	66°	29·281 29·330		Ditto ditto
				D C										
,, 26th	9 a. m.	66°·7	66°·7	29·35 29·410						67°	66°·6	29·245 29·300		Ditto ditto (Barometer falling).
,, 27th	7-30	61°	60°	29·265 29·330						67°	67°	29·220 29·280		Ditto ditto
,, 28th	6-30	56°	55°·4	29·222 29·300		75°	77°	29·279 29·328	7-30	63°·8	63°·5	29·242 29·303		Ditto ditto (Barometer *rising*).
,, 29th	6-45	55°	54°	29·25 29·320						71°	71°	29·26 29·31		Ditto ditto
,, 30th	4-15 †	64°·2	64°·2	29·318						61°	64°	28·683		Ditto ditto and Thayet-Myoung Tsakahn foot of hills East of Ye-mé-then.
,, 31st		57°	56°	28·666		70°	71°·8	27·433 27·478	8-30	56·°	54°	27·44 27·48		Thayet-Myoung Tsakahn and Nang-kway among the hills ditto ditto.
	† at 5 a. m.	59°	58°	29·317										

January 1865.

		Early Morning (4-30 or 5 O'c. A. M.)						Noon or Afternoon.						Evening (generally 9. O'c. 9-30 or 10 P. M.)						
		Therm.		Att. Therms.		Anrd. Baroms.		Therm.		Att. Therms.		Aneroids.		Therm.		Att. Therms.		Aneroids.		Stations and Remarks.
		N.	F.	c.	d.	D.	C.	N.	F.	c.	d.	D.	C.	N.	F.	c.	d.	D.	C.	
	A. M.													S P. M.						
Jan. 1st		45·5	43°·	42°·	39°	27·41	27·45	69°·	67°·8	71°·3	68°·8	27·45	27·49	56°·	54·°	57°·	55°·	27·45	27·49	Camp at Nang-eway, among hills east of Yé-mé-thèn.
2nd		45°·8	42°·7	44°·7	42°·3	27·20	27·45							64°·	59°·8	...	60°·	26·62	.....	Nang-eway, and Neoung-kee-douk Tsakahn.
3rd		60°·6	60°·	..	57°·	.....	26·50							55°·	60°· *	55°·	56°· *	27·9	28·03	Neoung-kee-douk, and Poung-loung Tsakhan.
4th		52°·	48°·7	50°·2	47°·	27·90	28·63							45°·4	42°·	45°·4	47°· *	27.20	26·82	Poung-loung Tsakhan, and Tsindoung-kee Tsn.
5th		48°·	45°.5	46·3	...	27·20	26·81	52°.	...	52°·	47°·	24·60	.	49°·6	45°·7	50°· *	46°· *	25·143	.....	Tsindoung-kee, and Tsindoung-kite Tsn. (*at noon, on summit of hill*;) cold wind.
6th		44°·5	40°·6	...	41°· *	25·10	...	(64°·6	63°·	60°·2 *	63°·8 * (at 4 O'c. P.M.)	25·64	25·38*)	48°·	45°·	47°·*	48°· *	25·65	25·4	Tsindoung-kite (very cold wind; frost on ground,) and Toung-hla village.
7th		42°·	38°·	39°·	37°· *	25·61	25·36	70°·						51°·6	49°·	51°·7	50°·5	25·85	25·69	Toung-hla; (a white frost,) and Oung-bân, in Zayat, (clear night, heavy dew falling.)
8th	7-30	40°·	44°·	43°·	43°·8	25·86	25·71	71°·8	71°·	71°·8	70°·	25·88	25·69	53°·	50°·5	59°·*	54°· *	25·87 *	25·694 * (a)	Oung-ban. This morn ice on water exposed $\frac{1}{8}$th inch thick. Very cold, clear, moonlight night,(a) 8 o'clock P. M. (b) 9 o'clock P. M.
														497 8 P. M.	46°·4	55°·6 *	52°· *	25·87 *	25·70 * (b)	
9th		40°·	36°·	41°· *	38°· *	25·814 *	25·646*	72°·7	73°· *	74°·7	...	25·783	25·51	50°·	48·	55°·4 *	54°·*	25·70 *	25·50*	Oung-ban, and Tin-gyay-gyat, cloudy afternoon, wind cold after 3. O'c; (frost again this morn.)
														8-30						
10th		37°·	34°·	39°·8 *	37°·8 *	25·656 *	25·44 *	Therm. rose to about 72° or 73°						59°·	55°·	59°·5	55·6	25·725	25·510	Tin-gyay-gyat, and Kyouk-tat: coldest morn; white frost.
11th		52°·	49°·	50°·	46°·	25·89	25·49	69°·7	69°·5	69°·	68 ·	25·750	25·517	59°·	54°·7	58°·3	54·4	25·743	25·530	Kyouk-tat Myo.
12th		56°.	53°·7	54 ·7	51°·	25·717	25·510	69°·3	67°·7	68 ·3	66°·	26.08	25·93	60°·	59°·3	60°·	61 · *	26·11	25·970	Ditto ditto, and Té-thone: Cloudy all day; heavy thunder storm in N. W., rain falling at 8. O'c. P. M.
13th		56·5	54··	55°·7	53°· *	26 085	25·95	Therm. did not rise beyond 58°· till 4 p. m. when it reached 60°· for a time.						56°·	53°·5	57·7	56·	26·560	26·500	Te-thone, and Lepangyin, raining at 6. A. M., then fog till 9; heavy storms throughout the day.

14th		50°·	47°·8	49°·	46°·5	26·520	26·444	Therm. barely rose to 60°· at noon.						52°·	50°·	53°·	52°·	27·55	27·222	Lopangyin, and Mine-byin Myo: Cloudy till past noon; cold, clear night.
15th	7-40	52°·	50°·	51°·	49°·	27·200	27·273	67°·	66°·	68°·	64°·	27·160	27·175	50°·8	49°·	49°·7	49°·	27·160	27·190	Mine-byin Myo: Fine sunny day though cold; Obs. in afternoon at 2 p. m.
16th	6-15	44°·8	42°·	42°·8	41°·	27·16	27·18	Therm. rose to about 70°·						53°·	52°·	53°·4	55°·	27·160	27·185	Ditto ditto; fine all day, the sun felt hotter.
														12 midnight.						
17th	6-15	44°·	42°·	43°·	42°·4	27·113	27·143	...	...	...	...	...		50°·3	49°·2	49°·3	51 ·	27·120	27·143	Ditto ditto.
18th	6-30	45°·	43°·	43°·3	42°·	27·123	27·158							51°·4	50°·7	51°·4	53°·	27·175	27·194	Ditto ditto.
19th		44 ·5	42°·	45°·	42°·	27·14	27·17							51°·	48°·	51°·	51°·	26·654	26·607	Ditto ditto, and Pan-saw Tsakahn: (white frost this morning.)
20th		46°·	43°·3	44°·7	42°·6	26·627	26·577							47°·8	...	48°·	44°·	26·303	26·22	Pan-saw Tsn. and Nattit village: heavy dew falling after sun-set.
21st		43°·7	...	43°·7	42°·	26·290	26·203	67°·	69°·	63°·5	...	25·580		53°·	...	54°·	50°·	25·560	.....	Nattit, and "Camp among hills:" Therm. in tent rose to 75° to-day.
														8-30						
22nd	7-30	57°·	...	57°·	51°·	25·590	.....	Therm. rose to 75° in tent; (not true shade.)						50 ·6	...	51°·4	50°·*	25·553	.....	"Camp among hills:" mild morn, cloudy till noon.
23rd		43°·	...	42°·	41°· *	25·502	.....	Therm. at 2-45 p. m. 81°.						52°·5	...	53°·4	54°·	26·148	26·024	Ditto ditto, and Camp on bank of Pön khyoung: heavy dew falling.
														8 p. m.						
24th		48°·	...	46°·6	46°·	25·110	25·088	69°·	...	71°·8	...	26·415	26·343	64°·4	...	66°·	63°·5	26·783	26·737	Camp at Pön khyoung, and Lé-deah Myo; (very cold morn, thick fog as misty rain.)
25th		52°·7	...	52°·2	49°·4	26·747	26·710	79°·	...	81°·6	79°·	26·750	26·700	62°·	...	64°·5	63°·	26·750	26·703	Le-deah Myo.
26th	6-30	52°·	...	51·3	48°·	26·702	26·662	78°·	...	81°·	78°·	26·700	26·630	59 ·8	...	61°·8	58°·3	26·700	26·640	Ditto ditto, (Barom. falling.)
27th	6-30	47°·8	...	47°·	44°·	26·664	26·626							56°(0-40 mid-						
	9	56°·		54°·	53°·	26·725	26·690							night.)		57°·5	54°·	26·655	26·597	Ditto ditto.
28th		...	...	...	...	.....	.....							57° (12 O'c midnight.)		59°·	56°·	26·700	26·640	Ditto ditto.
29th	8-15	57°·	...	56°·5	54°·	26·727	26·686	78°·		78°·7	75°·	26·725	26·670	62°·6	...	63°·8	60°·7	26·730	26·669	Ditto ditto, cloudy till noon (little rain), then sun-shine and windy, fine clear night.
30th		46°·	...	45°·3	43°·	26·667	26·620	77°·7		77°·8	...	...	26·520	48°·2	...	48°·	46°·	26·530	26·45	Ditto ditto, and Pân-kân yua.—A white frost over the country this morning.
31st		42°·	...	41°·5	37°·6	26·487	26·414	74°·		74°·6	...	...	25·906	46°·7	...	45°·8	41°·	26·041	25·898	Pân-kân yua, and Camp on road to Mine-kino Myo.

* Instruments in their cases in the Tent or Zayat.

February 1865.

	Early Morn 4-30 or 5 O'c. A. M.					Noon or Afternoon.				Evening, generally 9, 9-30 or 10 P. M.				Stations and Remarks.
		Therm	Att. Therm	Aneroids.		Therm.	Att. Therm	Aneroids.		Therm.	Att. Therm	Aneroids.		
		N.	c.	D.	C.	N.	c.	D.	C.	N.	c.	D.	C.	
Feby. 1st	...	42°·	40°·2	26·015	25·880	68°·	69°·	...	26·40	55°	56°·7	26·490	26·450	Camp on road to, and at Mine-kine Myo: very heavy dew; cold damp morning, but no frost; Therm. did not rise above 70.° to-day; strong breezes blowing up the valley, till late in the afternoon.
2nd	...	46°·	46°·3	26·450	26·396	.....	...	...	...	52°	52°·6	26·546	26·488	Mine-kine Myo, and Camp on bank of Tain Khyoung: morning foggy, damp, and cold; at 5. A. M., Therm. 45°·8.
3rd	...	47°·	47°·8	26·510	26·455	81°·6 (2 P. M.)		...	26·190	51°·8	51°·8	26·520	26·465	Camp on bank of Tain stream; Strong breezes. as usual, at noon and for several hours after.
4th	...	48°·	47°·	26·470	26·402	70° 5	69°·	...	...	55°·3	55°·3	26·288	26·182	Ditto ditto, and Camp at Nā-mong: (a dense fog came on at 6 O'clock A. M.)
5th	7·45	48°·3	46°·6	26·266	26·190	71°· (2 P. M.)		...	...	54°·4	54°·7	26·248	28·136	Camp at Nā-mong, (at 1 O'clock Therm. 70°; cool breezes, though sunny); frost on ground early this morning.
6th		46°·	44°·7	26·190	26·093	.. ...	...	...	...	49°·6	49°·6	26·588	26·540	Ditto ditto, and Kea-hoim: (the camp at Nā-mong was well sheltered; temperature out in the open was very much lower.)
7th	4·15	42°·	40·°	26·546	26·505	.....	...	...	...	58°·	59°·	26·607	26·558	Kea-hoim, and Bân-zân: (morning very cold.) At Bân-zân pleasant breezes. sunny, but not hot.
8th		49°·5	48°·7	26·554	26·512	74°·	...	...	26·620	59°·3	59°·8	26·700	26·653	Bân-zân Myo, and Hen-tone bazar. (8 miles east of Bân-zân town.)
9th	5 O'c.	52°·2	51°·3	26·665	26·626	.....				66°·	67°·5	27.048	27·53	Hen-tone bazar, and Kain-loon. (8-30. P. M.)
10th	7 O'c.	45°·3	43°·7	27·040	27·070	80°·	85°·	27·110	27·128	53°·5	53°·5	27·046	27·056	Kain-loon: (instruments on out side wall of tent, at noon great reflection from paddy ground.)

Feb. 11th	...	48°·	47°·	27·000	27 026	...		...	...	...	63°·	64°·	27·110	27·150	Kain-loon, and Camp at Mine-tha : cloudy all day. close; at even. boisterous wind ; at 9 P. M. clear sky.
12th	7 O'c	56°·7	56°·7	27·102	27·154	77°·	(3-30)		...	...	57°·3	58°·	27·090	27·132	Camp at Mine-tha.
13th	...	51°·	49°·6	27·030	27·080	...		...	...	...	65°·	66°·2	27·058	27·078	Ditto ditto, and on bank of Nam-mâ-lâ., day fine. pleasant, much cloud fleeting ; mild evening.
14th	...	47°·9	46°8	27·020	27·046	...		...	...	...	52°·2	52°·6	26·816	26·819	Camp on bank of Nam-mâ-lâ, and Oot-too : much cooler this evening.
15th	...	41°·3	40°·	26·780	26·795	...		...	...	...	54°·3	54°·2	27·233	27·290	Oot-too, and Camp in large Kyoung compound, 8 miles north of Oot-too : (morning very cold.)
16th	...	47°·7	46°·5	27·210	27·270	...		...	...	...	54°·7	56°·5	27·790	27.935	Camp at Kyoung compound, and Keoo-shang-nang, (the lowest station since leaving Poungloung Tsn. Jan. 4th.)
17th	...	44°	43°·5	27·757	27·919	70°·8		71°·9	.....	27·170	52°·	51°·	27·005	27·047	Keoo-shang-nang, and Ho-loi, (" Toung-tate.")-(morng. cold and raw. fog came on late.) Therm. max. 74°.
18th		49°·8	48°·	26·989	17·045	...	(3-30)		...	...	55°·	55°·	27·204	27·266	Ho-loi or Toung-tate, and Lâ-sheoo.
19th	...	.....	.....	.....	.....	77°·5		80°·	27·217	27·264	54°·	54°·	27·229	27·298	Lâ-sheoo. (very cold morn, but sun was on instruments when I had risen); day fine.
20th	6-45	46°·	45°·	27·225	77·314	76°·		77°·	27·270	27·345	59°·	59°·2	27·259	27·328	Ditto.
21st		45°·	43°·	27·217	27·298	...				...	57° 8	58°·7	27·200	27·266	Ditto. (Barometer falling.)
22nd	6 O'c	45°·	45°·3	27·143	27·219	...		...	...	...	61°·	62°·	27·223	27·297	Do. and Mine-tin : (day cloudy. at noon sky overcast, and at sun-set a little rain fell.
23rd	...	49°·	48°·	27·180	27 265	...		...	..	...	57°·	58°·	27·237	27·292	Mine-tin, and Mine-yin. East of Lâ-sheoo,
24th	...	49°·	48°·	27·193	27·258	...		...	...	...	61°·3	61°·	27·090	27·130	Mine-yin. and Mine-yaw Myo. (Mine-yin camp was sheltered beneath a Banyan grove ; much colder out in the open.)
	7-30	51°·3	48°	27·079	27.135	76°·		77°·	27·110	27·150	61°·5	61° 5	27·056	27·090	Mne-yaw town. (Barom. falling.) South east of Tainee-myo ; in Lat. 23°· N
26th	6	49°·5	48°·	27·000	27·056	...		...	...	...	63°	63°	27·028	27·049	Ditto.
27th	...	50°.6	49°·8	27·023	27·065	75°·		78°·	25·43	...	.....	... ..	.....	.....	Ditto. (At noon on "Loi-Sât," no good shade); most northerly point reached.
28th	...	.....	.....	.....	.....	...			...	...	60°·	61°·3	27·264	27·340	Neoum-mo. (On return march to Lâ-sheoo.)

March 1865.

Early Morning 4-30 or 5 A. M.						Noon or Afternoon.				Evening, generally 9. 9-30 or 10 P. M				Stations and Remarks.
		Therm.	Att. Therm.	Aneroids.		Therm.	Att. Therm.	Aneroids.		Therm.	Att. Therm.	Aneroids.		
		N.	C.	D.	C.	N.	C.	D.	C.	N.	C.	D.	C.	
March 1st	5-A. M.	51°·	50°·5	27·239	27·313	81°·	80°·37	...	27°·35	61°·6	61°·6	27·241	27·293	Camp at Neoum-mo, and at Lâ-sheoo. Thermometer (max.) about 82° Fht.
2nd	6-45	47°·7	46°·5	27 244	27·325	82°·	86·°	27·283	27·345	60°·8	61°·	27·268	27·330	Camp at La-sheoo : light clouds floating about ; strong breezes, as usual, at midday and afternoon.
3rd	6-45	48°·	47°·6	27·253	27·333	...	...	...	...	59°·6	60°·2	27·233	27·290	Ditto ditto ditto.
4th	6-50	50°·	48°·8	27 230	27·307	...	...	...	...	.....	...	...	...	Ditto ditto ditto.
5th	.....	.....	..	...	...	...	...	...	...	65° 3	66°·	27·240	27·200	Ditto ditto ditto.
6th	.....	53°·	53°.	27·212	27·285	...	...	...	...	60°·	62°·	27·058	27·107	Ditto ditto, and at Ho-loi, (Toung-tate) village.
7th	.....	54°·3	54°·3	27·026	27·070	84°·	80·°	27·986	28·138	65°·7	66°·7	27·933	28·098	Ho-loi, and Ban-zé Myo. At 2 P. M. Thermometer in Zayat rose to 89°.
8th	.....	55°·	55°·	27·915	28·090	...	...	...	...	broken.	62°·7	27·245	27·309	Ban-zé Myo, and Pa-sine village. (Thermometer (N.) unfortunately was broken by a fall from the Tent ropes.)
9th	.....	broken.	51°·4	27 220	27·293		...	...	...	11.45	61·°6	26·693	26·678	Pa-sine, and Mine-zaik.
10th	.....		57°·	26·642	26·630		...	...	...		72°·5	26·960	26·973	Mine-zaik, and Ban-sin Kyoung.
11th	.....		55°.3	26·895	26·930		...	...	...		...	...	...	Ban-sin Kyoung. Strong wind during afternoon.
12th	8-30		70°·7	26·979	27·012		...	...	...		71·°6	26·933	26·948	In Zayat at Mine-yé, east to Ban-sin. Strong winds as usual at, and after noon.
13th	.....		60°·	26·888	26·910		...	...	...		57°·	26·750	26·733	Mine-yé, and Bam-pé. Colder this evening than for many days past, heavy dew falling.

14th	.....	45°·3	26·675	26·680			...	...		56°·5	26·670	26·670	Bam-pé, and Camp in little vale among hills; very cold morning, but hot as soon as the sun was well up.
15th	.....	51°·	...	...	3 P. M.	92°·8	27·000	27·007		62°·6	27·030	27·073	Camp among hills, and "on bank of large stream," one march to east.
16th	.. ...	56°·	27·015	27·07		...	...	...	11-45 P.M.	64°·5	26·567	26·533	Camp on bank of large stream, and Mine-kah village (to east of morning's Camping ground.)
17th	.....	57°·	26·547	26·525		...	...	...	10-30	67° 3	26·564	26·523	Mine-kah village.
18th	.....	56°·7	26·525	26·488		...	...	...		63°·6	26·992	27·033	Ditto ditto, and Ho-nam, south of Mine-kah.
19th	4-A. M.	54°·	26·933	26·983		...	...	...		58°·5	27·213	27·284	Ho-nam village, and Camp at small stream among hills east of Ho-nam.
20th	.....	49°·3	27 21	27·290		...	...	...		62°·	27·237	27·294	Camp at small stream among hills, and Ho-too, (at 3 P. M. Thermometer 90°.)
21st	.....	50°·4	27·193	27·266		...	...	...		68°·5	28·625	28·859	Ho-too, and Camp on bank of Salween River. Latitude 21°56′ N.
22nd	.. ...	63°·3	28·642	28·881		81°·3	28·638	28·873		68°·7	28·610	28·850	Camp on bank of Salween. Instruments about 40 feet above the present level of the water.
23rd	.....	63° 8	28·629	28·880		80°·7	28·600	28·834		...	...	...	Ditto ditto.
24th	.....	...	...	...		...	...	...		67°·	27·821	27·982	Camp at Maw-pwá village on hills east side of the Salween.
25th	.....	58°·	27·822	27·995		...	...	...		...	...	...	Ditto ditto.
26th	.....	...	...	...		...	...	...		65°·7	28·647	28·897	Camp at Bâm-pân bazar, on level bank near the river.
27th	7-30-A.M.	60°·	28·714	28·983		...	...	...		68°·6	28·60	28·85	Ditto ditto: (foggy morning.)
28th	.....	62° 2	28·63	28·898		...	...	...		...	...	...	Ditto ditto.
29th	8-30-A.M.	67°·	...	29·052		...	...	...		70°·	28·69	28·940	Camp on sand bank east side of the river, opposite Hoi-sim.
30th	6-20-A.M.	64°	28 752	29·020		...	...	...		...	...	...	Ditto ditto

Early Morn 4-30 or 5 O'c. A. M.						Evening, generally 9. 9-30 or 10 P. M.					Stations and Remarks.
		Therm.	Att. Therm.	Aneroids.			Therm.	Att. Therm.	Aneroids.		
			c.	D.	C.			c.	D.	C.	
April 1st			...	...	...	9-30		65°·	28·799	29·060	Tá-caw ferry on the Salween. (Instruments on raft, 5 feet above water level.)
			...	...	...	10-30		64°·	28·805	29·075	Cool breezes all the evening; heavy dew falling.
2nd	8 A. M.		64°·6	28·897	29·190	8-P. M.		70°·	28·753	29·00	Tá-caw ferry. Instruments on raft, river has risen during the night about 2½ feet or more, and is still rising at 8 P. M. about 4 feet since yesterday evening.
3rd	5-45		58°·7	28·836	29·118			...	...	...	Tá-caw ferry.
4th	10-30		80°·	26·847	26·872			...	...	...	Top of high hill, on the march from Tá-caw to westward.
5th			63°·8	27·995	28·182			...	...	...	Kong-hüi on the Nam-pân river, or Ben Khyoung, west of Tá-caw.
6th			64°·7	27·07	27·128			...	...	...	Si-mone village, on the road to Lé-deah.
7th			...	...	...			...	...	...	
8th			...	...	...			...	...	...	
9th			...	...	...	10-30		81°·5	26·676	26·644	Lé-deah, very hot day, at 3-30 P. M. in Zayat Anrd. Therm. 103°.
10th			69°·	26·626	26·599	8-20		72°·5	26·035	25·910	Lé-deah, and Camp on bank of Pon Khyoung near Ban-chain; cloudy, thunder in the distance.

11th		54°·7	26·01	25·915	(8-30 A.. M.*	71°·	24·670	). ...	Camp on bank of the Pon stream near Ban-chain, west of Lé-deah.
12th		...	...	...		...	...	,,.	
13th		...	...	...	8-40	66°·	27·059	27·102	Mine-byin Myo, west of Nattit.—Cloudy afternoon; heavy storm in the distance.
14th	3-15 A. M.	67°·4	27·019	27·07		71°·5	26·688	26·670	Mine-byin Myo, and Camp at Nam-pit or Pwim-pit.—Cloudy, at 3 P. M. rain fell.
15th	4 A. M.	60°.	26·613	26·593		...	...	...	Camp at Nam-pit or Pwim-pit.
16th		...	...	...		...	...	...	
17th	10·30	65°·5	...	...	8-20	70°·	25·628	...	Pway-hla.—Cloudy morning, with cold wind, and little rain falling occasionally; at 10-30 A. M., very heavy thunder storm, and much rain till about 1-30 P. M. At even storm in North-west.
18th		64°·7	25·631	...		78°·	27·407	27·510	Pway-hla, and Tsingoo Tsn. west of Pway-hla, on the road to Hline-det.
19th	4 A. M.	69°·7	27·362	27·483		...	...	...	Tsingoo Tsakahn (Zayat.)
20th	4 A. M.	72°·7	28·55	28·787		...	...	...	1st Obsn. at Koo-gee village on stream called "Myit" at foot of hills, now in Burma Proper.
	8-20 A. M.	78°·	28·164	28·388		...	...	...	2nd Obsn. on the march from Koo-gee to Hline-det.—An intensely hot day.
21st	noon.	103°·	29·039	29·230		...	...	...	Hline-det. Instruments in open Zayat, (timber roof,) Therm. rose to 107° at 3 P. M.; hot winds blowing from across the plain.
22nd		...	...	...	8-30	96°·	29·003	29·175	Zayat† at Hline-det.—Early morn cool and fresh, but later sultry and hot. At 2 and 3 P. M. Therm. 105°·5; breezes now and then.
23rd	10 A. M.	91°·	29·111	29·305	7 P. M.	80°·8	29·034	29·237	Hline-det.—Not so intensely hot to-day; whole sky misty and cloudy; rain fell at 4 P. M. and continued falling gently during the evening.

* On the March crossing hills to Nattit on a lower part of the Pon stream.

† The thin wooden roof is hardly true shade, and it retains the heat long after Sun-down.

F. FEDDEN,
Geol. Survey of India.

APPENDIX.

The following are some of the calculations for Latitude, worked out in detail, from meridian observations taken at the several halting places on the route. The system of working is mainly that of Raper.

1864 *November 30th—Toungoo Cantonment.*

Thermometer 76° Fht. *Longitude about* 96° 30′ *E.*
Barometer 29·763 Inches.

Raper.

Mean Refrac. at 50	= 50″·6	(T.31.)
Therm. corr.	— 2″·6	(T.32.)
Barom. corr.	— 0″·4	(T.33.)
	47″·6	
Px. in Alt. 50°	= — 5″·6	
Corr. of Alt.	... 42″·0	

	h. m.
E. Long. 96° 30′	= 6 26
	—24
G. Date Nov. 29th	17 34 (appt. time.)

Obs. Alt. ⊙	... 98° 13′ 50″
Index error	— 1′ 30″
	2) 98° 12′ 20″
Appx. Alt. ⊙	... 49° 6′ 10″
Corr. of Alt.	— 0 0 42″
True Alt. ⊙	... 49° 5′ 28″
Sun's semi-diam.	+ 16′ 15″·7
True Alt. ⊙	... 49° 21′ 43″·7
	— 90°
Zenith dist.	... 40° 38′ 16″·3 *N.*
Red. decl.	... 21° 42′ 24″·0 *S.*
True Latitude	... 18° 55′ 52″·3 *N.*

Sun's decl. 29th ... *S.* 21° 35′ 17″·1
30th ... *S.* 21° 45′ 0″·9 (incrg.)

Norie.

Daily var. (24 h.) 0° 9′ 43″·8 = Log. ·3925 (Txxxiii)

G. D. Nov. 29th 17·34 = Log. ·1355 („)

Log. ·5280 = 7′ 6″·9

h. m.			
Or G. D.	17 34	var.	9′ 43″·8
	17 30	„	9′ 30″ = 6′ 55″·6
	4	„ „ „	= 2″·4
	17 30	„	0 14″ = 10″·0
			7′ 7″·0

Sun's decl. 29th 21° 35′ 17″·1
Red. decl. *S.* 21° 42′ 24″·0

Sun's decl. 29th 21° 35′ 17″·1
Corr. for long. + 7′ 7″

Red. decl. *S.* 21° 42′ 24″·1

TOUNGHOO CANTONMENT—LATITUDE 18° 55′ 52″ *N.*

1864 *Decr. 8th (noon) Myo-hla village, near frontier.*

Therm. ... 80·° Fht.
Barom. ... 29·642 Inches.

Long. about ... 96° 30′ *E.*

Mean refrac. at 47° 30′=53″·5
Therm. corr. ... — 3″·3
Barom. corr. .. — 0″·6
49″·6
Px. in Alt. 48 .. — 5″·8
Corr. of Alt. ... 43″·8

h. m.
E. long. 96°30′=6 26
—24
G. D. Dec. 7th 17 34

Obs. Alt. ⊙ ... 95° 7′ 40″
Index error — 1′ 30″
2) 95° 6′ 10″
47° 33′ 5″
Corr. of Alt. — 43″·8
47° 32′ 21″·2
Semi-diam: ... + 16′ 16″·9
True Alt. ⊙ ... 47° 48′ 38″·1
— 90°
Zenith dist. ... 42° 11′ 21″·9 *N.*
Red. decl. ... 22° 45′ 48″·7 *S.*
True Latitude ... 19° 25′ 33″·2 *N.*

Sun's decl. 7th *S.* 22° 41′ 13″·1
8th *S.* 22° 47′ 29″·5 (incrg.)

Daily var. (24 h.)... 6′ 16″·4 = log. ·5826

G. D. Dec. 7th 17 34 = log. ·1355

log. ·7181 = + 4′ 35″·6

Sun's decl. 7th 22° 41′ 13″·1
Red decl. *S.* 22° 45′ 48″·7

h. m.
Or G. D. 17 34 var. 6′ 16″·4
17 30...6 = 4′ 22″·5
„ „ 16·4 = 12″·2
„ 4 6 16 = 1″·075
4′ 35″·775
Sun's decl. 7th, 22° 41′ 13″·1
Red. decl. *S.* 22° 45′ 48″·775

1864 *December 12th (noon) Nyin-gyan town, (Camp on north bank of stream.)*

Therm. 84° Barom. 29·520 *Longitude about* 96° 20′ *E.*

Mean refrac. at 47° 20′	=53″·8
Therm. corr.	— 3″·6
Barom. corr.	— 0″·9
	49″·3
Px. at 47° 20′	— 5″·9
Corr. of Alt.	43″·4

	h.	m.	s.
E. long. 96° 20′ =	6	25	20
	— 24		
G. Date Dec. 11th,	17	34	40

Obs. Alt. $\overline{\odot}$	...	94° 45′ 10″
Index error	...	— 1′ 30″
	2)	94° 43′ 40″
		47° 21′ 50″
Corr. of Alt.		43″ 4
True alt. $\overline{\odot}$	...	47° 21′ 6″·6
Sun's semi-diam.		16′ 17″·3
True alt. $\odot$	...	47° 4′ 49″·3
		— 90°
Zenith dist.	...	42° 55′ 10″·7 *N*
Red. decl.	...	*S.* 23° 6′ 52″·7
True Latitude	...	*N.* 19° 48′ 18″·0

Sun's decl. 11th *S.* 23° 3′ 36″·6
12th *S.* 23° 8′ 4″·2 (increg.)

Daily var. (24 h.) 4′ 27″·6 = log. ·7310

G. D. Dec. 11th, 17 35 = log. ·1351

log. ·8661 = + 3′ 16″·0

Sun's decl. 11th 23° 3′ 36″·6

Red. decl. *S.* 23° 6′ 52″·6

NYIN-GYAN MYO (*North Side of Town*) LATITUDE 19° 48′ 18″

1864—*December 13th (noon.) Nyin-gyan (Camp on north bank of stream.)*

Thermometer 82° Barometer 29·54 *Longitude about* 96° 20′ *E.*

Mean refrac. at 47° 10′	= 54″·0	Obs. alt. ⊙	... 94° 38′ 10″
Therm. corr. ...	— 3·5	Index error	... — 1′ 30″
Barom. corr. ...	— ·9		2) 94° 36′ 40″
	50·6		47° 18′ 20″
Px. in alt. 47° ...	— 5·9	Corr. of alt.	... 44″·7
Corr. of alt. ...	44·7	True alt. ⊙	... 47° 17′ 35″·3
	h. m. s.	Semi-diam.	... — 16′ 17″·4
E. long. 96° 20′	= 6 25 20		47° 1′ 17″·9
	— 24		— 90°
G. Date Dec. 12th,	17 34 40		N. 42° 58′ 42″·1
		Red. decl. ...	*S.* 23° 11′ 0″·0
		True Latitude...	N. 19° 47′ 42″·1

Sun's decl. 12th	S. 23° 8′ 4″·2	
13th	S. 23° 12′ 4″·2	(incrg.)
Daily var.	4′ 0″	= log. ·7781
G. D. 12th	17 34 40	= log. ·1351
		log. ·9132 = + 2′ 55″·8
		Sun's decl. 12th 23° 8′ 4″·2
		Red. decl. *S.* 23° 11′ 0″·0

NYIN-GYAN-MYO—LATITUDE 19° 47′ 42″ *N.*

1864—*December 14th (noon.)* *Nyin-gyan (North side of stream.)*

Therm. 81°·5 Barom. 29·56 *Longitude about* 96° 20′ *E.*

Mean. refrac.	47° 10′	=	54″·1
Therm. corr.	...	—	3·5
Barom. corr.	...	—	0·9
			50·7
Px. in alt. 47° 10′		—	5·9
Corr. of alt.	...		44″·8

E. long.	96° 20′ =	*h.* 6	*m.* *s.* 25 20
	—	24	0 0
G. D. Decr. 13th		17	34 40

Obs. alt. ⊙	...	94°	31′ 0″
Index error	—		1′ 5″
	2)	94°	29′ 55″
		47°	14′ 57·5
Corr. of alt.	—		44″·8
True alt. ⊙	...	47°	14′ 12″·7
Semi-diam.	—		16 17·5
True alt. ⊙	...	46	57 55·2
	—	90°	
Zenith dist.	...	43	2 4·8 *N.*
Red. decl.	...	23	14 38·6
True Latitude	N.	19°	47′ 26″·2

Sun's decl. 13th	23° 12′	4″·2
„ „ 14th	23° 15′	36″·5
(24*h.*)	3′	32″·3 = log. ·8320
G. D. 13th (17*h.*)	34′	40″·5 = log. ·1351
	log. ·9671 = +	2′ 34″·4
Sun's decl. 13th	23° 12′	4″·2
		2 34·4
Red. decl. ...	23° 14′	38″·6

NYIN-GYAN—LATITUDE 19° 47′ 26″ *N.*

105744

1864—*December 15th (noon.) Camp at Kee-doung.*

Therm. 82° Barom. 29·46 *Longitude about* 96° 20′ *E.*

Mean refrac.	46° 30′	= 55″·34	Obs. alt. ⊙		93°	7′ 45″
Therm. corr.		— 3·40	Index error.		—	1′ 5″
Barom. corr.		— 1·2		2)	93	6 40
		50·74			46	33 20
Px. in alt.		— 6·14	Corr. of alt.		—	44″·6
Corr. of alt.		44″·6			46	32 35·4
		h. m. s.	Sun's semi-diam.		+	16 17·6
East long. 96° 20′	=	6 25 20	True alt. ⊙		46	48 53·0
	—	24			— 90	
G. date 14th	...	17 34 40	Zenith dist.		43°	11′ 7″ *N.*
			Red. decl.	*S.*	23°	17″ 51″·8
			True Latitude	*N.*	19°	53′ 15″·2

Sun's decl. 14th S. 23° 15′ 36″·5
„ „ 15th S. 23 18 40·9 (incrg.)

Daily var. (24*h.*) 3 4·4 =log. ·8924

G. D. 17 34 40=log. ·1353

log. 1·0277= 2′ 45″·3

Sun's decl. Dec. 14th *S.* 23° 15′ 36″·5

Red. decl. *S.* 23° 17′ 51″·8

Camp at Kee-doung—Latitude 19° 53′ 15″2.

1864—*Dec.* 17*th* (*noon.*) *Camp at Gyo-ben-kong (north of Menyua.)*

Therm. (about) 80·° Barom. 29·4 *Longitude about* 96° 20′ *E.*

Mean. refrac. at	46°10′ = 55″·98	Obs. alt. ⊙ ...	92° 22′ 50″
Therm. corr. ...	— 3·5	Index error ...	— 1′ 5″
Barom. corr. ...	— 1·2		(2) 92 21 45
	51·28		46 10 52·5
Px. in alt. ...	+ 6·15	Corr. of alt. ...	45″·13
Corr. of alt. ...	45″·13		46 10 7·37
		Sun's Semi-diam	+ 16 17·7
		True alt. ⊙ ...	46 26 25·07
			— 90
	h. m. s.	Zenith dist. ...	*N.* 43 33 34·93
E. long.	96° 20 = 6 25 20	Red decl. ...	*S.* 23 22 51·1
	— 24	*True Latitude*	*N.* 20° 10′ 43″·83
G. Date Decr. 16th	17 34 40		

Sun's decl. 16th *S.*	23° 21′ 17″·4	
„ „ 17th *S.*	23° 23′ 25″·7	(incrg.)
Daily var. (24 h.)	2′ 8″·3	= log. 1·0510
G. D. Dec. 16th	17 35	= log. ·1353
	log. 1·1863 =	1′ 33″·7
Sun's decl. Dec. 16th		23° 21′ 17·4
Red decl.		*S.* 23° 22′ 51″·1

1864 *Dec.* 19*th* (*noon.*) *Nai-oung-gan, Isakaun.*

Therm. 80° Fht. Barom. 29·255 *Longitude about* 96° 18′ *E.*

Mean refrac. ...	46″=56″·33	Obs. alt. ⊙ ...	91° 59′ 55″
Therm. corr. ...	— 3·49	Index error	— 1′ 5″
Barom. corr. ...	— 1·60		2) 91° 58′ 50″
	51·24		45° 59′ 25″
Px. in alt. ..	— 6·14	Corr. of alt.	— 45″·1
Corr. of alt. ...	45″·1		45° 58′ 39·9
		Semi-diam	+ 16′ 17·86
		True alt. ⊙	46 14 57·76
	h. m. s.		— 90°
E. long. ... 96° 18′=	6 25 15	Zenith dist. ...	43° 45′ 2″·24 *N.*
	— 24	Red. decl. ...	23° 25′ 58″·54 *S.*
G. D. Dec. 18th	17 34 45	*True Latitude* ...	20° 19′ 3″·70 *N.*

Sun's decl. Dec. 18th 23° 25′ 5″·8
„ „ „ 19th 23° 26′ 17″·8 (incrg.)

Daily var. (24*h.*) 1′ 12″ =log. 1·3010

G. D. 18th 17 34 45=log. ·1352

log. 1·4362=+ 52″·74

Sun's decl. 18th 23° 25′ 5″·8
+ 52·74

Red. decl. *S.* 23 25 58·54

1864. *Dec. 20th (noon.)* *Yé-mé-then town.*

Therm. 77° Barom. 29·230 *Longitude about* 96° 7′ 30″ *E.*

Mean refrac. 45°50′	=	56″·69	Obs. alt. ⊙	...	91° 44′ 56
Therm. corr. ...	—	3·20	Index error	—	1 5
Barom. corr. ...	—	1·43			2) 91 43 51
		52·06			45·51 55·5
Px. in alt. ...	—	6·16	Corr. of alt.	—	45·9
Corr. of alt. ...		45·90			45 51 9·6
			Semi-diam	+	16 17·9
			True alt. ⊙	...	46 7 27·5
				—	90
		h. m. s.			
E. long. 96 730	=	6 24 30	Zenith dist.	...	43 52 32·5 *N.*
	—	24	Red. decl.	...	23 26 49·77*S.*
G. Date Dec. 19th		17 35 30	*True Latitude*	...	20° 25′ 42″·83*N.*

⊙'s decl. 19th ...	23° 26′ 17″·8			
„ „ 20th ...	23 27 1·5	(incrg.)		
	43·7	= log. 1·5199		
G. D. Dec. 19th	17 35 30	= log. ·1349		
		log. 1·6548 =	+	31″·97
		Sun's decl. 19th	23° 26′	17″·8
		Red. decl. *S.*	23° 26′	49″·77

1864 *Dec: 22nd (noon.)* *Yé-mé-then town.*

Therm. 76° Barom. 29·257 *Longitude about* 96° 5′ *E.*

Mean. refrac: 46°		= 56″·63	Obs. alt. ⊙	...	91°	43′ 30″
Therm. corr.	...	— 3·05	Index error		—	1′ 5″
Barom. corr.	...	— 1·55			2)91	42 25
		52·03			45	51 12·5
Px. in alt.	...	— 6·1	Corr of alt.		—	45·9
Corr, of alt.	...	45·9			45	50 26·6
			⊙'s Semi-diam		+	16 18·0
	h.	*m.* *s.*			46	6 44·6
E. long. ... 96° 5′ =	6	24 20			— 90	
	— 24					
G. D. Dec. 21st...	17	35 40	Zenith dist.		43	43 15·4 *N.*
			Red decl.		23	27 7·2 *S.*
			True Latitude		20°	26′ 8″·2 *N.*

Sun's decl. 21st	23° 27′ 16″·9	S
„ „ 22nd	23° 27′ 3·8	S (decr.)
Daily var. (24 h.)	13·1	= log. 2·0444
G. D. Dec. 21st...	17 35 40	= log. ·1348
		log. 2·1792 = — 9″·6
	Sun's decl. 21st	23° 27′ 16″·9
	Red. decl.	23° 27′ 7″·3

Or G. D. 17 35 40 var. 13″ = 9″·84—

Sun's decl. 21st	23	27 16·9
Red decl. *S.*	23°	27′ 7″·1

1864 *Dec. 24th (noon.)* — *Ye-mé-then or Yé-mé-zin.*

Therm. 78° Barom. 29·33 — *Longitude (assumed)* 96° 7′ 30″ E.

Mean refrac. 45° 50′		= 56″·64
Therm. corr.	...	— 3·05
Barom. corr.	...	— 1·35
		52″·26
Px. in alt.	...	— 6.1
Corr. of alt.	...	46·16

Obs. alt. ⊙	...	91°. 46′ 40″
Index error		— 1 5
		2) 91 45 35
		45 52 47·5
Corr. of alt.		— 46·2
		45 52 1·3
⊙s' Semi-diam		+ 16 18·1
		46 8 19·4
		— 90
Zenith dist.		43 51 40·6 *N.*
Red decl.		23 25 32·0 *S.*
True Latitude		20° 26′ 8″·6 *N.*

	h.	m.	s.
E. long. 96° 7′30″	= 6	24	30
	— 24		
G. D. 23rd (appt. time)	17	35	30

⊙'s decl. 23rd ...	23° 26′ 22″·5 S.	
„ „ 24th ...	23 25 12·8 S.	
Daily var.	...	1′ 9″·7

G. D. 17 35 30 var. 1′ 9″·7

„ „ 1′ = 43″·7

„ „ (decr.) 9″·7 = 6·56

„ „ ·2

— 50·46

Sun's decl. 23rd 23° 26′ 22·5

Red. decl. 23° 25′ 32″.04 *S*

YE-ME-THEN—30 MILES, NORTH OF LAT. 20·°

1864 *December 28th (noon)* *Yé-mé-then or Yé-mé-zin.*

Therm. 75° An. Th. 77° (mean 76°) *Longitude (assumed)* 96° 7′ 30″ *E.*
Bar. (c) 29·328 (d) 29·279 (mean· 300)

Mean refrac. at 46° =	56″·3	Obs. Alt.	⊙ 92° 4′ 0″*
Therm. corr.	— 3·05	Index error	— 1 5
Barom. corr.	— 1·35		2)92 2 55
	51·9		46 1 27·5
Px. in alt. 46	— 6·0	Corr. of alt.	— 45·9
Corr. of alt.	45·9		46 0 41·6
	h. m. s.	Semi-diam	+ 16 18·2
E. long. 96° 7′ 30″ =	6 24 30		46 16 59·8
	— 24		— 90
G. D. 27th Decr.	17 35 30 (appt.)	Zenith dist. ...	43 43 0·2 *N.*
		Red decl. ...	*S.* 23 16 40·35
⊙'s decl. 27th	23° 18′ 54″·1	*True Latitude*	*N.* 20° 26′ 19″·85
28th	23 15 51·6 (dece.)		
Daily var.	3 2·5		
G. D.	17 35 30 var.	3′ 2″·5 = 2′ 13″·75	
Log.	·1349 + log.	·8971 = 1·0320	

Sun's decl. 27th 23° 18′ 54″·1
— 2′ 13·75

Red decl. 23° 16′ 40″·35

NOTE.—*There might have been ten or twenty seconds added to the Obs. alt. and this would bring the result nearer the previous observations.—Thus:—

92 4 20
1 5

2)92 3 15

46 1 37·5
— 45·9

46 0 51·6
+ 16 18·2

46 17 9·8
90

43 42 50·2
23 16 40·35

True Latitude. *N.* 20 26 9·85

1865 *January 4th Tsindoung-kee Tsn:* (*'foot of Elephant hill.'*)

Therm. 66° Barom. 27 in. *Longitude* (*assumed*) ... 96° 35′ *E.*

Mean refrac. 46	=	56″3	Obs. alt. ⊙	...	92° 2′ 0″
Therm. corr.		1·9	Index error		— 1 5
Barom. corr.		6·1			2) 92 0 55
		48·3			46 0 27·5
Px. in alt. 46°		— 6·1	Corr. of alt.	...	— 46·2
Corr. of alt.		42·2			45 59 41·3
			Semi-diam	...	+ 16 18·2
			True alt. ⊙	...	46 15 59·5
		h. m. s.			— 90
E. long. 96° 35′	=	6 26 20	Zenith dist.	...	43 44 0·5 *N.*
		— 24	Red. decl.	...	22 43 18·5 *S.*
G. D. Jan. 3rd		17 33 40	*True Latitude*		* 21° 0′ 42″ *N.*

Sun's decl. 3rd S. 22° 47′ 52″·8
„ „ 4th S. 22 41 37 0

Daily var. (24 h.) dec. 6 15·8 = log. ·5843

G. D. 3rd 17 33 40 = „ ·1356

log. ·7199 = − 4 34·3

Sun's decl. 3rd 22 47 52·8

Red decl. *S.* 22 43 18·5

* *Note.*—Too high: the observation must have been at a little after noon (apparent time,) as I feared.

1865 *January 5th (noon.)* *Summit of Tsindoung-gyee.*

Therm. 52° Barom. 24·6 *Longitude (assumed)* 96° 35′ *E.*

Mean refc. at 6°30′	=	55″·35
Therm. corr.	—	·25
Bar. corr. (about)	—	10·0
		45·10
Px. at 46°30′	=	5·97
Corr. of alt.		39″·13

---

		h.	*m.*	*s.*
E. long. 96° 35′	=	6	26	20
	—		24	
G. D. Jany. 4th		17	33	40

Obs. alt. ⊙ ...		93°	14′ 40″
Index error	—		1 5
	2)	93	13 35
		46	36 47·5.
Corr of alt.	—		39·13
		46	36 8·37
⊙'s semi-diam	+		18 18·2
		46	52 26·57
	—	90	
Zenith dist.		43	7 33·43 *N.*
Red Decl.		22	36 42·5 *S.*
True Latitude		20°	30′ 50″·93 *N.*

⊙'s decl. Jan. 4th	22°	41′	37″·0
5th	22	34	54·3
Daily var. (24*h.*) decr.	6	42·7	= log. ·5541
G. D. Jan. 4th	17	33·40	= log. ·1356
		log.	·6897 — 4′ 54″·5
⊙'s decl. Jan. 4th			22° 41 37·0
Red decl.			*S.* 22° 36′ 42″·5

1865 *January 6th (noon.) Toung-hla village. Shan States.*

Therm. (about) 60° Barom. 25·65 *Long. (assumed)* 96° 40′ E.

Mean refrac. 46 40	= 55″·02	Obs. alt. ⊙	...	93° 25′ 25″
Therm. corr.	— 1·16	Index error	—	1 .5
Bar. corr. (about)	— 8·0		2)	93 24 20
	45·86			46 42 10
Px. at 46 40	— 6·04	Corr. of alt.	—	39·8
Corr. of alt.	39″·82			46 41 30·2
		Semi diam	... +	16 18·2
	h. m. s.	True alt.	...	46 57 48·4
E. long. 96° 40′ =	6 26 40		—	90
	— 24	Zenith dist.	...	43 2 11·6*N.*
G. D. Jan. 5th ...	17 33 20	Red. delc.	...	22 29 40·1 *S.*
		True Latitude	...	20° 32′ 31″·5 *N.*

Sun's decl. 5th ...	22° 34′ 54″·3 *S.*		
„ „ 6th ...	22 27 44·8 *S.* (decr.)		
Daily var. (24 h.)	0° 7′ 9″·5 = log.	·5254	
G. D. Jan. 5th...	17 33 20 = log.	·1358	
	log.	·6612 = —	5′ 14″·2
	Sun's decl. Jan. 5th		22° 34′ 54″·3
	Red. decl. *S.*		22° 29′ 40″·1

1865 *January* 11*th* (*noon.*) *Kyouk-tat.*

Therm. 69°·5 Barom. 25°·7 in. *Longitude* (*assumed*) 96° 45′ *E.*

Mean refrac. 47°5′=54″·25			Obs. Alt. ⊙	...	94° 11′ 55″
Therm. corr.		2·35	Index error	—	1 5
Barom. corr. (about)		7·00			2) 94 10 50
		44·90			47 5 25
Plx. at 47°	...	5·93	Corr. of Alt.	—	38·97
Corr. of Alt.	...	38·97			47 4 46·03
			Semi diam.	+	16 17·9
					47 21 3·93
				—	90
			Zenith dist.	...	42° 38′ 56″·07 *N.*
			Red. decl.	...	21° 47′ 54″·0 *S.*
			True Latitude	...	20° 51′ 2″·0 *N.*

E. long. ... 96° 45′=	*h. m. s.* 6 27 0	
	— 24	
G. D. Jany. 10th	17 33 0	
⊙'s. decl. „ 10th	21° 54′ 43″·5	
„ „ „ 11th	21° 45′ 23″·6	(decr.)
Daily var. in 24 h. ...	0° 9′ 19″·9	(decr.)=log. ·4102.
G. D. 10th	17 33	=log. ·1359.
		log. ·5461= 6′ 49″·5
Sun's decl. 10th		21° 54 43·5
Red. decl.		21° 47′ 54″·0 *S.*

Or. *From Raper* (*Table* 21,) *& p.* 190.

	h. m.		
G. D. 10th ...	17 33	var. 9′	19″·9
	17 30	9′	=6′ 33″·7
	3	9′	= 1·21
	17 30	20″	= 14·9
	3	20″	= ·6
			6′ 50″·4
Sun's decl. 10th			21° 54′ 43″·5
Red. decl.			21° 47 53·1 *S.*

1865 *January* 18*th* (†) *Mine-lyin Town.*

Therm. 70° Barom. 27·1 *Long. (assumed)* 96° 45′ *E.*

Mean refrac. 48°	=	52″·6	Obs. alt. ⊙		96° 1′ 30″
Therm. corr.	...	2·0	Index error	—	1 5
Barom. (about)	..	4·4			2)96 0 25
		46·2			48 0 12·5
Plx. in alt. 48°		5·7	Corr. of alt.	—	40·5
Corr. of alt.		40·5	⊙'s Semi-diam.		47 59 32·0
					16 17·4
					48 15 49·4
				—	90
			Zenith dist.		41 44 10·6
			Red decl.	*S.*	20 31 47·4
			Latitude	*N.*	21° 12′ 23″·2

	h.	*m.*	*s.*
E. long. 96°45′ =	6	27	0
—	24		
G. D. 17th Jany.	17	33	0

⊙'s decl. 17th *S.* 20° 40′ 42″·1
,, 18th *S.* 20 28 30·8

Daily var. (24 h.) 12′ 11″·3 = log. ·2943

G. D. 17 33 = log. ·1359

log. ·4302 = — 8′ 54″·7
Sun's decl. 17th 20° 40′ 42″·1

Red. decl. *S.* 20° 31′ 47″·4

† The observation was taken at a little after noon apparent time, the result is too high. (My Chron. must have been at least 15 minutes slow).

1865 *Jany. 19th (noon.) Pan-saw Tsn. 6 or 7 miles E. of Mine-byin.*

Therm. 76° Barom. 26·7 *Long. (assumed about.)* 96° 50′

Mean refrac. at 48 10		=52″·3
Therm. corr.	...	2 ·5
Barom. corr.	...	5 ·7
		44 ·1
Plx. at 48°	...	5 ·7
Corr. of alt.	...	38 ·4

	h.	*m.* *s.*
E. long. 96° 50′	=6	27 20
	—24	
G. D. 18th Jan.	17	32 40

Obs. alt. ☉	...	96° 35′ 35″
Index error	—	1 5
	2)	96 34 30
		48 17 15
Corr. of alt.	—	38·4
		48 16 36·6
Semi-diam.	+	16 17·4
		48 32 54·0
	—	90
		41 27 6
Red. decl. *S.*	...	20 19 19
True lat. N.	...	21° 7′ 47″

☉'s decl. 18th	*S.* ...	20° 28′ 30″·8	
„ „ 19th	*S.* ...	20 15 56·3	(decr.)
Daily var. (24h)	...	12 34·5	=log. ·2807
G. D. 18th	...	17 32 40	=log. ·1360
			log. ·4167 = 9′ 11″·8

Sun's decl. 18th 20° 28 30·8

Red. decl. *S.* 20° 19′ 19″·0

1865 *January* 21*st* (*noon.*) *Tsakahn among hills, beyond Nattit.*

Therm. 68° or 69° Barom. 25·58. *Longitude (assumed)* 97° 15′ 0″ *E.*

Mean refrac. at 48°30′	=	51″·6
Therm. corr.	—	2·00
Barom. (about)	—	8·
		41·60
Plx. in alt. 48°30′	—	5·6
Corr. of alt.		36·0

	h.	*m.*	*s.*
E. long. 97° 15′ =	6	29	0
	— 24		
G. D. 20th	17	31	0

Obs. Alt. ⊙		97° 15′ 10″
Index error	—	1 5
	2)	97 14 5
		48 37 2·5
Corr. of Alt.	—	36·0
		48 36 26·5
Semi-diam.	+	16 17·2
		48 52 43·7
	—	90
Zenith dist. *N.*		41 7 16·3
Red decl. *S.*		19 54 7·15
True latitude N.		21° 13′ 09″·15

⊙'s decl. 20th	*S.*	20° 2′ 58″·9
,, ,, 21st	*S.*	19 49 39·0 (decr.)
Diffce. (24 h.)		13′ 29″·1 = log. ·2499
G. D. Jany, 20th		17 31 = log. ·1363
		log. ·3862 = —8 51·75
Sun's decl. 20th Jany.		20 2 58·9
Red. decl.		19° 54′ 7″·15

1865 *January 24th (noon.) At breakfast place before reaching Lédéah.*

Therm. 69° Barom. 26·4 (Att. Therm. 71°·8)

Longitude (assumed about) 97° 26′ *E.*

Mean refrac. 49 16	=	50″·40	Obs. alt. ⊙		98° 33′ 10″
Therm. (70°) corr.	—	2 ·00	Index error	—	1 5
Barom. (about)	—	6 ·00			
		42 ·4		2)	98 32 5
Plx. in alt. 50	—	5 ·6			
					49 16 2·5
Corr. of alt.		36 ·8	Corr. of alt.	—	36·8
					49 15 25·7
E. long. 97° 26′	=	6° 29′ 44″	Semi-diam.	+	16 16·9
	—	24			
					49 31 42·6
G. D. 23rd		17 30 16		—	90
			Zenith dist.		40 28 17·4 *N.*
			Red. decl.		19 11 20·9 *S*
			True latitude		21° 16′ 56″·5 *N.*

⊙'s decl. 23rd	*S.* 19° 21′ 52″·9		
„ „ 24th	*S.* 19 7 27·5	(decr.)	
Daily var. (24 h.)	14 25·4	=log.	·2213
G. D. 23rd	17 30 16	=log.	·1372
		log. ·3585	= — 10′ 31″·0
		Sun's decl. 23rd	19 21 51″·9
		Red. decl.	*S.* 19° 11′ 20″·9

1865 *January 29th (noon.) Lé-déah Myo.*

Therm. 76° (Att. Th. 78°) Barom. (c.) 26·67 and (d.) 26·72.

Long. (assumed) about 97° 30′ *E.*

Mean refrac. 50°30′ =		48″·15
Therm. corr.	—	2·50
Barom. (about)	—	6·
		39·65
Plx. in alt. 50°30′	—	5·0
Corr. of alt.		34″·65

	h.	*m.*	*s.*
E. lōng. 97° 30 =	6	30	0
	— 24		
G. D. Jany. 28th	17	30	0

Obs. Alt. ⊙		101° 7′ 55″
Index error	—	1 5
	2)101	6 50
		50 33 25
Corr. of alt.	—	34·6
		50 32 50·4
Sun's semi-diam.	+	16 16·2
		50 49 6·6
	—	90
	N.	39 10 53·4
Red decl.	*S.*	17 54 35·0
True latitude	*N.*	21° 16′ 18″·4

Sun's decl. 28th	*S.*	18° 6′	19″·5
„ „ 29th	*S.*	17 50	13·0
Daily var. (24 h.)		16	6·5 (dec.)
G. D. 28th		17 30	= log. ·1732
			= log. ·1372
			log. ·3104 = — 11′ 44″·5
Sun's decl. Jany. 28th		18 6	19·5
Red. decl.	*S.*	17° 54′	35·0

LÉ-DEAH.—18¾ MILES NORTH OF LAT. 21·°

1865, *January* 30*th* (*noon.*) *At Pan-kan village north of Lé-déah.*

Therm. 77°·7 Barom. 26·5 *Longitude, (assumed)* 97° 30′ *E.*

Mean refrac. at 50 40	=	47·88	Obs. alt. ⊙	...	101°	25′	10″
Therm. corr. ...		— 2·7	Index error	—		1	5
Barom. (about) ...		— 5·18					
		40·00		2)	101	24	5
Plx. at 50 40 ...		— 5·0					
					50	42	2·5
Corr. of alt. ...		35·00	Corr. of alt.	—			35·0
					50	41	27·5
			Semi-diam.	+		16	16·1
	h.	*m.* *s.*					
E. long. 97° 30· =	6	30 0	True alt. ⊙	...	50	57	43·6
	—24			—	90		
G. D. 29th	17	30 0	Zenith dist.	...	39	2	26·4
			Red. decl.	*S.*	17	38	14·5
			True Latitude	*N.*	21°	24,	1″·9

⊙'s decl. 29th	17°	50′	13″·0	
„ „ 30th	17	33	47·4	
Daily var. (24*h.*)		16	25·6	= log. ·1647
G. D. 29th		17	30	= „ ·1372
				„ ·3019 = — 11′ 58″·5
				Sun's decl. 29th 17 50 13·0
				Red. decl. 17° 38′ 14″·5

1865, *February 1st (noon.) Camp ¾ mile N. E. of Mine-kine Myo.*

Therm. 68° Barom. 26·4 *Long. (assumed about)* 97° 25′ *E.*

Mean. refrac. 51°	=	47·3	Obs. alt. ⊙		102°	5′ 25″
Therm. corr.	—	1·8	Index error	—		1 5
Barom. (about)	—	5·5				
		40·0			2)102	4 20
Plx. in alt. 50°	—	5·6			51	2 10
Corr. of alt.	—	34·4	Corr. of alt.	—		34·4
					51	1 35·6
		h. m. s.	⊙'s semi-diam.	+		16 15·8
E. long. 97° 25′	=	6 29 40				
	—	24	True alt ⊙		51	17 51·4
G. D. Jany. 31st		17 30 20		—	90	
			Zenith dist. ⊙		38	42 8·6 *N.*
			Red. decl.		17	4 38·0 *S.*
			True latitude.		21°	37′ 30″·6 *N.*

Sun's decl. Jany. 31st	17°	17′	3″·3	
„ Feby. 1st	17	0	0·9	(dec.)
	17	2·4	= log. ·1488	
G. D. Jany. 31st	17	30	20	= log. ·1372
			„ ·2860	= — 12′ 25″·3
			Sun's decl. Jany. 31st	17 17 3·3
			Red. decl. S.	17° 4′ 38″·0

1865, *February 4th (noon.)* *Camp near Nah-mong.*

Therm. 70° Barom. 26·19

Long. (assumed) about 97° 30′ E.
or 97° 28′

Mean refrac. at 51° 40′ =		46·2
Therm. corr.	—	2·0
Barm. (about)	—	6·
		38·2
Plx. in alt. 50°	—	5·6
Corr. of alt.	—	32·6

	h.	*m.*	*s.*
E. long. 97° 30′ =	6	30	0
—	24		
G. D. Feby. 3rd.	17	30	0

Obs. alt. ☉		103°	25′ 45″
Index error	—		1 5
	2)	103	24 40·
		51	42 20
Corr. of alt.	—		32·6
		51	41 47·4
Semi-diam.	+		16 15·8
		51	58 3·2
	—	90	
Zenith dist.		38	1 56·8 *N.*
Red. decl.		16°	12′ 0″·0 *S.*
True Latitude		21°	49′ 56″·8 *N.*

Sun's decl. Feb. 3rd	16°	25′	3″·3
„ „ „ 4th	16′	7	8·8 (dec.)
Daily var. (24h.)		17	54·5 = log. ·1272
G. D. Feb. 3rd.		17	30 = „ ·1372
			„ ·2644 = — 13′ 3″·3
Sun's decl. Feb. 3rd	16°	25′	3·3
Red. decl. *S.*	16°	12′	0″·0

1865, *February 8th (? after noon.) Hentone Bazaar, south of village.*

Therm. 74° Barom. 26·6 — *Long. (assumed)* 97° 45′ *E.*

Mean refrac. 53° =	44·0	
Therm. corr.	— 2·3	
Barom. (about)	— 5·0	
	36·7	
Plx. in alt 53°	— 5·6	
Corr. of alt.	31·1	

	h.	*m.*	*s.*
E. long. 97° 45′ =	6	31	0
	— 24		
G. D. Feby. 7th	17	29	0

Obs. alt. ☉		106°	7′	0″
Index error	—		1	5
	2)	106	5	55
		53	2	57·5
	—			31·1
		53	2	26·4
Semi-diam.	+		16	14·6
		53	18	41·0
	—	90		
	N.	36	41	19·0
Red. decl. ...	*S.*	14	57	58·6
Latitude ...	*N.*	21°	43′	20″·4*

☉'s decl. Feby. 7th	15°	11′	47″·6	
„ „ „ 8th	14	52	49·4	(dec.)
Daily var. (24*h*.)		18	58·2	= log. ·1022
G. D. Feby. 7th		17	29	= log. ·1376
				log. ·2398 = — 13′ 49″·0
				Sun's decl. Feb. 7th 15° 11′ 47″·6
				Red. decl. *S.* 14 57 58·6

* This cannot be correct, for Hentone is in a higher latitude than Nah-mōng.

1865, *February 10th (noon.) Camp near Kain-loon.*

Therm. 80° Barom. 27·1 *Long. (assumed about)* 97° 50′ *E.*

Mean refrac. 53° 20,	=	43″·4
Therm. corr.	—	2·9
Barom. corr.	—	4·
		36·5
Plx. in alt. 50°	—	5·5
Corr. of alt.		31·0

		h.	m.	s.
E. long. 97° 50′	=	6	31	20
	−	24		
G. D. Feb. 9th		17	28	40

Obs. alt. ⊙		106°	50′	10″
Index error	—		1	5
	2)	106	49	5
		53	24	32·5
Corr. of alt.	—			31·0
		53	24	1·5
⊙'s Semi-diam.	+		16	14·2
		53	40	15·7
	—	90		
Zenith dist. ... *N.*		36	19	44·3
Red. decl. ... *S.*		14	19	25·9
True Latitude ... *N.*		22°	0′	18″·4

Sun's decl. Feb.	9th	14° 33′	36″·1
„ „ „	10th	14 14	8·4 (decr.)
Daily var. (24 h.)		19	27·7 = log. ·0911
G. D. Feb. 9th		17 28 40	= log. ·1377
			log. ·2288 = — 14′ 10″·2
Sun's decl. Feby. 9th			14° 33 36·1
Red. decl.			*S.* 14 19 25·9

1865, *February 15th (noon.)* *Camp in large Kyoung Comp : N. of Oot-too*

Therm. 76° Barom. 27·2 *Long. (assumed about)* 97° 38′ *E.*

Mean refrac.	... 54° 30′	= 41″·6	Obs. alt. ⊙	... 109°	3′ 10″
Therm. corr.	...	— 2 ·5	Index error	—	1 5
Barom. about	...	— 4·			
		35·1		2) 109	2 5
Plx. in alt. 54°	...	— 5·0			
		30·1		54	31 2·5
Corr. of alt.	...		Corr. of alt.	—	30·1
				54	30 32·4
		h. m. s.	Semi-diam.	+	16 13·2
E. long.	... 97° 30 =	6 30 32		54	46 45·6
		—24		— 90	
G. D. Feby. 14th		17 29 28		35	13 14·4
			Red. decl. *S.*	... 12	39 0·1
			True Latitude	... 22°	34′ 14″·3

Sun's decl. Feby. 14th 12° 54′ 0″·1
„ „ „ 15th 12 33 25·7 (decr.)

Daily var. (24 h.) 20 34·4 = log. ·0669

G. Date Feb. 14th 17 29 28 = log. ·1372

log. ·2041 = —15′ 0″·0

Sun's decl. 14th 12 54 0·1

Red. decl. *S.* 12 39 0·1

1865, *February 20th, (noon.)* *Camp at Lâ-sheoo.*

Therm. 76° Barom. 27·3 *Long. (assumed about)* 97° 30′ *E.*

Mean refrac. ... 55° 50	= 39″·65	Obs. alt. ☉	... 111° 47′ 50″
Therm. corr. ...	— 2″·15	Index error	— 1′ 5″
Barom. corr. ...	— 3″·45		
	34″·05		2) 111° 46′ 45″
Plx. in alt. 55° 50′	— 4″·95		
			55° 53′ 22″·5
Corr. of alt. ...	29″·10	Corr. of alt.	— 29″·1
			55° 52′ 53″·4
	h. m. s.	Sun's semi-diam.	+ 16′ 12″·2
E. long. ... 97° 30′	= 6 30 0		
	— 24		56° 9′ 5″·6
G. D. 19th ...	17 30 0		— 90° 0
		Zenith dist.	*N.* ... 33° 50′ 54″·4
		Red. decl.	*S.* ... 10° 53′ 29″·3
		True Latitude	*N.* ... 22° 57′ 25″·1

Sun's decl. 19th *S.* ... 11° 9′ 10″·8
„ „ 20th *S.* ... 10° 47′ 39″·8 (decr.)

Daily var. (24 h.) 21′ 31″·0 = log. ·0474

G. D. 19th ... 17 30 = log. ·1372

log. ·1846 = — 15′ 41″·5
Sun's decl. 19th 11° 9′ 10″·8
Red. decl. *S.* 10° 52′ 29″·3

1865, *March 1st (noon.) Camp near stockade at Lä-sheoo.*

Therm. 80° Barom. 27·35 *Long. (assumed about)* 97° 30′ *E.*

Mean refrac. 59° 12′	=	35″·33
Therm. corr.	—	2·10
Barom. corr.	—	2·90
		30·35
Plx. at 60°	—	4″·3
		26″·03

		h.	*m.*	*s.*
E. long. 97° 30′	=	6	30	0
	—	24		
G. D. Feb. 28th		17	30	0

Obs. alt. ⊙		118° 26′ 15″
Index error	—	1′ 5″
		2)118° 25′ 10″
		59° 12′ 35″
Corr. of alt.	—	26″
		59° 12′ 9″
Semi-diam.	+	16′ 10″·1
True alt. ⊙		59° 28′ 19″·1
	—	90°
Zenith dist. *N.*		30° 31′ 40″·9
Red. decl. *S.*		7° 33′ 29″·1
True Latitude N.		22° 58′ 11″·8

Sun's decl. Feb. 28th	7° 50′ 5″·1	
„ „ Mar. 1st	7° 27′ 18″·7	(decr.)
Daily var. (24 h.)	22′ 46″·4	= log. ·0229
G. D. Feb. 28th	17 30	= log. ·1372
		log. ·1601 = — 16′ 36″·0
		Sun's decl. Feb. 28th 7° 50′ 5″·1
		Red. decl. *S.* 7° 33′ 29″·1

1865, *March 2nd, (noon.)* *Lâ-sheoo. Camp near stockade.*

Therm. 80° Barom. 27·34 *Longitude (assumed)* 97° 30′ *E.*

Mean refrac.	... 59° 30	= 34″·4	Obs. alt. ⊙	...	119° 12′ 0″
Therm. corr.	...	— 2″·1	Index error	—	1 5
Barom. corr.	...	— 2″·9			
		29″·4		2)	119 10·55
Plx. in alt. 60°	...	— 4″·3			
					59 35 27·5
Corr of alt.	...	25″·1	Corr. of alt.	—	25·1
					59 35 2·4
			Semi-diam.	+	16 19·9
		h. m. s.			59 51 12·3
E. longitude	97° 30′ =	6 30 0		—	90
		— 24			
G. D. March 1st		17 30 0	Red. decl.	*N.*	30 8 47·7
				S.	7 10 38·2
			True Latitude	*N.*	22° 58′ 9″·5

Sun's decl. March 1st 7° 27′ 18″·7
„ „ „ 2nd 7 4 26·1 (decr.)

Daily var. (24 h.) 22 52·6 = log. ·0209

G. D. March 1st 17 30 = log. ·1372

log. ·1581 = — 16′ 40″·5
Sun's decl. March 1st 7° 27′ 18·7

Red. decl. *S.* 7° 10′ 38·2

LA-SHEOO.—2 MILES SOUTH OF LATITUDE 30°

1865, *February 25th, (noon?) Camp at Mine-Yaw.*

Therm. 76° Barom. 27·1 — *Longitude (assumed)* 97° 50′ *E.*

Mean. refrac. at 57° 30′	=	37″·2
Therm. corr.	—	1″·8
Barom. corr.	—	3″·3
		32″·1
Plx. in alt.	—	4″·3
Corr. of alt.	...	27″·8

	h.	m.	s.
E. long. 97° 50′ =	6	31	20
—	24		
G. D. Feby. 24th	17	28	40

Obs. alt. ⊙		115° 18′ 30″
Index error.	—	1 5
		2)115 17 25
		57 38 42·5
Corr. of alt.	—	27·8
		57 38 14·7
Semi-diam.	+	16 11·0
		57 54 25·7
	—	90
Zenith dist.		32 5 34·3 *N.*
Red. decl.		*S.* 9 3 45·8
True Latitude		*N.* 23° 1′ 48″·5*

Sun's decl. Feby. 24th		9° 19′ 59″·3
,, ,, 25th		8 57 42·2 (decr.)
Daily var. (24 h.)		22 17·1 = log. ·0322
G. D. Feby. 24th	17 28 40	= log. ·1378
		log. ·1700 = — 16′ 13″·5
Sun's decl. 24th		9° 19′ 59″·3
Red. decl. *S.*		9° 3′ 45″·8

* If a little after noon, apparent time, the latitude resulting will be higher than the true latitude.

1865, *February 27th, (noon.)* *Loi-sût, hill E. of Mine-Yaw.*

Therm. 72° (or little less.) Barom. 25·4 *Long. (assumed about)* 98° 0′ *E.*

Mean refrac. 58° 25′	= 36″·00	Obs. alt. ⊙	...	116° 50′ 30″
Therm. corr.	— 1″·5	Index error	—	1′ 5″
Barom. corr. (about)	4″·0		2)	116° 49′ 25″
	30″·5			58° 24′ 42″·2
Plx. in alt. 60°	— 4″·3	Corr. of alt.	—	26″·2
Corr. of alt.	26″·2			58° 24′ 16″·3
		Semi-diam.	+	16′ 10″·6
				58° 40′ 26″·9
			—	90°
				31° 19′ 33″·1
		Red. decl.	*S.*	8° 18′ 42″·7
		True Latitude	*N.*	23° 0′ 50″·4

	h.	*m.* *s.*
East long. 98° ...	= 6	32 0
	—	24
G. D. Feby. 26th	— 17	28 0

Sun's decl. Feby. 26th 8° 35′ 17″·2
„ „ 27th 8° 12′ 44″·7 (decr.)

Daily var. (24 h.) ... 22′ 32″·5 = log. ·0273

G. D. Feby. 26th 17′ 28″ = log. ·1380

log. ·1653 = — 16′ 24″·5

Sun's decl. Feby. 26th 8° 35′ 17″·2

Red. decl. ... *S.* 8° 18′ 42″·7

HIGHEST LATITUDE ATTAINED.

1865 *March 7th, (noon.) Banzé Myo. Lowest ground in the Shan States.*

Therm. 84° (Att. Therm. 80°)
Barom. (c) 28·13 (d) 27·98 *Long. (assumed about)* 97° 38′ *E.*

Mean refrac. at 61°40′	=	31″·52	Obs. alt. ⊙		123°	23′	20″
Therm. corr. ...	—	2·3	Index error	—		1	5
Barom. corr. ...	—	21·5					
		27·07		2)	123	22	15
Plx. in alt. 60° ...	—	4·3			61	41	7·5
Corr. of alt. ...		22·77	Corr. of alt.	—			22·7
					61	40	44·8
			Semi-diam.	+		16	8·5
	h.	*m.* *s.*					
E. long. 97° 38′	= 6	30 32	True alt ⊙		61	56	53·3
	—	24		—	90		
G. D. March 6th	17	29 28					
			Zenith dist.		28	3	6·7
			Red. decl.	S.	5	15	1·0
			True latitude	*N.*	22°	48′	5″·7

Sun's decl. March 6th 5° 32′ 0″·5
„ „ „ 7th 5 8 42·3

Daily var. (24 h.) 23 18·2 = log. ·0128

G. D. 17 30 = log. ·1372

log. ·1500 = — 16′ 59″·5
Sun's decl. on 6th 5° 32′ 0″·5

Red. decl. *S.* 5° 15′ 1″·0

1865 *March 20th, (noon)* *Camp at Hotoo Village.*

Att. Therm. (c) 79° (say 82°)
Barom. 27·3 and 27·2

Longitude assumed about 98° 20′ *E.*

Mean refrac. 67° 30′ =		24″·1
Therm. corr.	—	1·6
Barom. corr.	—	2·5
		20·0
Plx. in alt. 70· =	—	3·4
Corr. of alt.		16·6

	h.	m.	s.
East long. 98° 20′ =	6	33	20
—		24	
G. D. Mar. 19th	17	26	40

Obs. alt. ☉		135°	15′	10″
Index error	—		1	5
		2)135	14	5
		67	37	2·5
Corr. of alt.	—			16·6
		67	36	45·9
Sun's semi-diam.	+	16		5·1
		67	52	51·0
	—	90		
Zenith dist.		22′	7	9·0
Red. decl.	*S.*	0	8	24·5
True latitude	*N.*	21°	58′	44″·5

Sun's decl. Mar. 19th S. 0° 25′ 38″·0
„ „ „ 20th S. 0 1′ 56″·3 (decr.)

Daily var. (24h.) 23′ 41·7 log. ·0056

G. D. Mar. 19th ... 17′ 27 = log. ·1385

log. ·1441 = — 17′ 13″·5
Sun's decl. Mar. 19th 0° 25′ 38″·0

Red. decl. *S.* 0° 8′ 24″·5

1865 *March 21st, (noon.)* *Camp on bank of Salween River.*

Barom. (c) 28·8 (D) 28·6
Att. Therm. (c) 81° (say 80°) *Long. assumed about* 98° 30′ *E.*

Mean refrac.	68″ 3′ = 23·0	Obs. alt. ☉	...	136°	8′ 0″
Therm. corr.	— 1·4	Index error	—		1′ 5
Barom. corr.	— 0·9				
	21·7		2)	136	6 55
Plx. in alt. 70°	— 3·3				
Corr. of alt.	18·4			68	3 27·5
		Corr. of alt. ...	—		18·4
				68	3 9·1
		Semi-diam	+		16 4·8
	h. m. s.			68	19 13·9
E. long. 98° 30′	= 6 34 0		—	90	
	— 24				
		Zenith dist.	*N.* ...	21	40 46·1
G. D. March 20th	17 26 0	Red. decl.	*N.* ...	0	15 15·95
Sun's decl. 20th *S.*	0° 1′ 56″·3	*True latitude*	*N.* ...	21°	56′ 2″·05
„ „ 21st *N.*	0° 21′ 44″·8				

Var. (24*h.*) 0 23 41·1 = log. ·0058

G. D. March 20th 17 26 = log. ·1388

log. ·1446 = — 17′ 12″·25
Sun's decl. 20th *S.* 0° 1′ 56″·30

Red. decl. ... *N.* 0° 15′ 15″·95

N. B.—As the Greenwich date is merely assumed, the sun's declination cannot be ascertained very accurately; for in March the sun's decl. changes nearly 1′ an hour, or 1″ in 1. m.

1865 *March 23rd, (noon.) Camp on bank of Salween River.*

Att. Therm. (c) 80°·7 (say 80°)
Barom. (c) 28·834 (d) 28·600. *Long. assumed* 98° 30′ E.

Mean refrac. 68° 50′	=	22″·6
Therm. corr.	—	1″·45
Barom. corr. ...	—	1″·55
		19″·6
Plx. at 70° ...	—	3″·2
Corr. of alt. ...		16″·4

	h.	m.	s.
E. long. 98° 30′	= 6	34	0
	— 24		
G. D. Mar. 21st	17	26	0

Obs. alt. ☉	137°	43′	0″
Index error	—	1	5″
	2)137°	41′	55.″
	68°	50′	57″·5
Corr. of alt.	—		16·4
	68°	50′	41″·1
Semi-diam	+	16′	4″·3
True alt. ☉	69°	6′	46″·4
	— 90°		
Zenith dist. *N.*	20°	53′	14″·6
Red. decl. *N.*	1°	2′	35″·4
True latitude N.	21°	55′	50″·0

Sun's decl. Mar. 22nd N.	0°	45′	24″·9	
„ „ „ 23rd N.	1°	9′	3″·5	(incr.)
Daily var. (24h)	0°	23′	38″·6	= log. ·0065
G. D. Mar. 22nd ...		17′	26	= log. ·1388
				log. ·1453 = + 17′ 10″·5
Sun's decl. Mar. 22nd				0° 45′ 24″·9
Red. decl.				*N.* 1° 2′ 35″·4

This is the last day that the Sextant can be used in these latitudes for meridian observations.

(*Signed*) F. Fedden,
Geological Survey,
British Burma.

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